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Isolation and Identification of Bacteria Associated with Metal Biocorrosion

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Abstract- This research was carried out in Birnin kudu water treatment plant and some distribution channels within the town of Birnin Kudu on Bacterial that causes metal corrosion, deteriorate and brought pipes failure. The water treatment plant is located in Birnin kudu local government area of Jigawa state, Nigeria. Bacterial counts showed the presence of large bacterial cells in the various samples collected. The enumeration of sample from Birnin kudu treatment plant, Audu Bako way showed higher colonies among all the samples, Various metals associated with microbiological influence corrosion harbor large microbial population, which is estimated to be around 10³ to 10⁹ CFU/ml. This research confirms the association of metal bio corrosion with microbiological entities – especially bacteria. Two species of bacteria namely *Bacillus subtilis* and *Bacillus cereus* associated with corroded metals have been isolated and indentified. The effective prevention and control of MIC can be achieved through proper characterization of the microorganisms and understanding their specific role in corrosion processes. Involvement of microorganisms and microbial metabolites accelerate the deterioration of industrial water system producing considerable damages, and finally destruction of the industrial water system.

Index Terms- Bacteria, *Bacillus Subtilis*, *Bacillus Cereus*, Bio Corrosion, Metals

I. INTRODUCTION

Microbiological influenced corrosion (MIC) is type of corrosion that is caused by microbes. In industrial world, especially Oil and Gas industry, thought to play an important role in this process. The forms of degradation are commonly localized at several areas, which have more contact with microbial activity (Lee and Newman, 2003; Zou, 2007).

Microbiologically influenced corrosion (MIC) attacks industrial world sections from water distribution in cast iron mains and sewers to transport of natural gas in steel pipelines. It has been estimated that for the oil industry, MIC cause approximately 40% of damage (Fontana, 1986). With that fact, it can be concluded that MIC is a serious industrial problem and yet the basic mechanism of MIC has remained unclear.

There are two types of microbes that are often related to MIC. They include: sulphate-reducing bacteria and iron-oxidizing bacteria (ASM2004). The damages caused by microbes are frequently related with the deposits formed around the corrosion or because of their metabolism. Microbes perform oxidation and reduction reactions that simply affect the stability of metals in the

environment. Sulphate-reducing bacteria reduce sulphate into sulphite and then form hydrogen sulphide. On the other hand, iron-oxidizing bacteria will consume the ferrous ionic around the metal for their metabolism.

Due to their opportunistic behavior, microorganisms are known to influence the energy yielding corrosion reaction, often enhancing corrosion in order to harvest the energy released (Fang *et al.* 2002) known as microbiologically influence corrosion (MIC). It has been postulated that microorganisms can accelerate the corrosion process by as much as 1000 to 10,000 times, as abiotic corrosion is often a relatively slow process (Fang *et al.* 2002).

Various metals are submitted to MIC in natural waters where the microbial population is estimated to be around 10³ to 10⁹ CFU/ML. Within a relatively short time depending on the environment, extracellular polymeric substance (EPS) production and microbial growth will result in a mature biofilm. The biofilm facilitates MIC by altering the chemistry such as pH, pressure, oxygen levels and nutrients at the interface between the metal and the bulk solution (Beech and Sunner, 2004; Videla and Herrera, 2005). This leads to major changes in the concentration and type of ions, redox potentials, pH and Oxygen levels, resulting in an alteration of the active or passive properties of the metal as well as the corrosion products formed (Videla and Herrera, 2005). The main reason of carrying out these research work is to isolate and identify the bacterial associated with metal corrosion in Birnin kudu water treatment plant in order to reduce the deterioration of bacterial corrosion on metal pipes and to seek for alternative solutions.

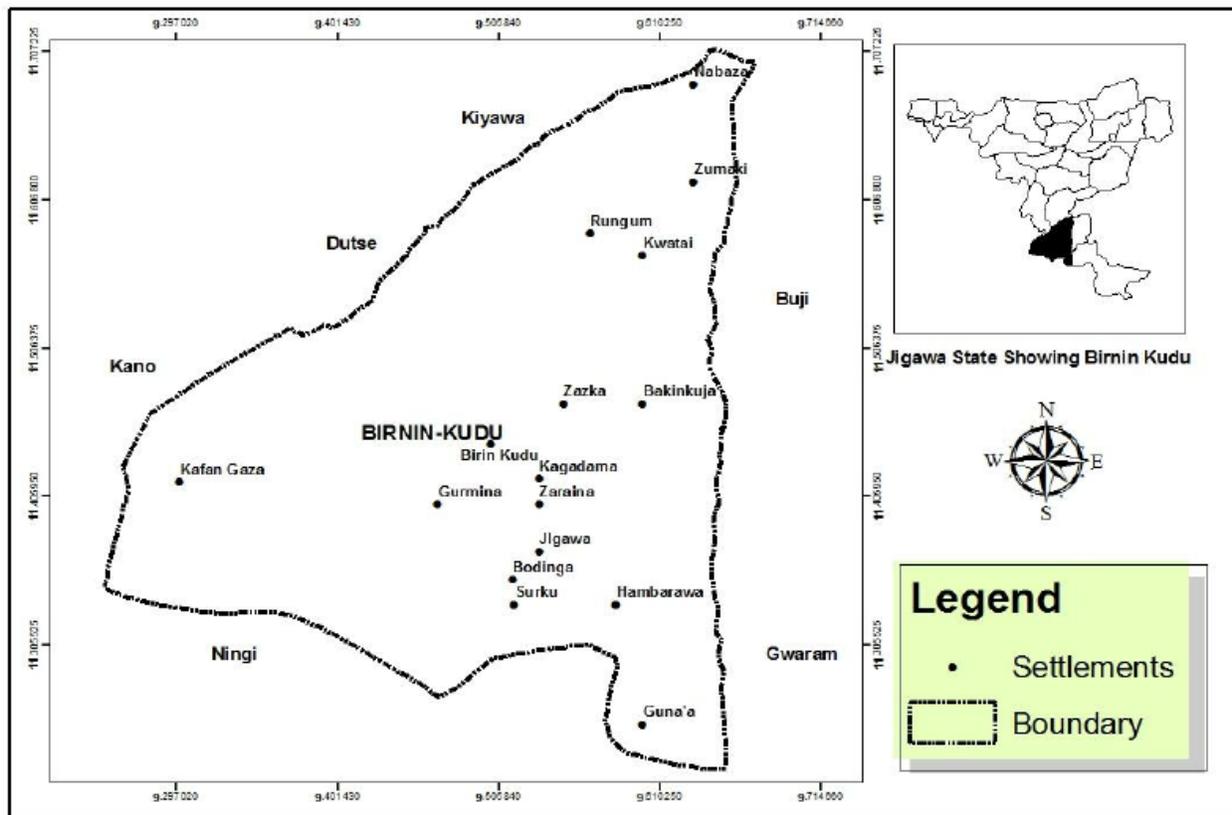
II. MATERIAL AND METHODS

The study Area

Birnin Kudu town, Jigawa state, northern Nigeria. It lies at the intersection of roads from Kano city, Gwaram, and Ningi. Coordinate UTM: geographical coordinates in decimal degree (WGS84) Latitude 11.450, Longitude 9.500 geographical coordinates in degree minutes seconds (WGS84) Latitude 1127,00 Longitude 930,00. It is best known as the site of Dutsen Habude, a cave containing Neolithic paintings of cattle (which bear strong resemblance to some found in the central Sahara) and rock gongs believed to be more than 2,000 years old. It is a collecting point for peanuts (groundnuts), which are sent to Kano city 76 miles (122 km) west-northwest for export by rail, and is a market centre for millet, sorghum, peanuts, cowpeas, cotton, and livestock.

Birin Kudu is a town and a Local Government Area in the south of Jigawa State, Nigeria. It is 120 kilometres south-east of

Kano. The town of Birin Kudu had an estimated population of 27,000 (Census,2006).



Source: Department of Geography BUK (2014)

Topography and Soil

Southern part are underlain by granites, schists and gneisses of the basement complex. However, the basement complex rocks have undergone weathering to give rise to fairly deep soils which are covered by a sheet of laterite which has been exposed by denudation in some places.

Occupation

Agricultural activities is their main occupation in Birin kudu which includes cultivation of crops such as millet, sorghum, peanuts, cowpeas, cotton and rearing of animals which includes goats, sheeps, and cows (livestock) and few traders.

Relief and drainage

The relief is generally undulating, but the rock outcrops. Birin kudu the southern part of the state, the relief is about 500-600 meters above the sea level.

Climate

The climate of the Birin kudu is semi-arid, which is characterized by a long dry season and short wet season. The temperature regime is warm to hot. The mean annual temperature is about 25°C but the mean monthly values range between 21°C in the coldest month and 31°C in the hottest month. Vegetation

Guinea savannah vegetation are found in the Birin kudu which is the southern part of the state. Extensive open grasslands,

with few scattered stunted trees, are characteristics of the vegetation.

Sample collection

Samples of pipe scrape were collected from five areas, these includes:

1. First sample is located at Audu Bako ways, and the area is situated at the middle of the city, most of the pipe linkages that supplies water to Birin kudu passes through the area.
2. Second sample is located at Gangare area, the pipe scrape is found within distribution channels in Gangare Area.
3. Third sample is located at Zango quarters water treatment plant branch Birin kudu. The branch supplies water to most parts of the Zango quarters
4. Fourth and fifth sample were found from the service tank pipes in Birin kudu water treatment plant, which were the main pipes that discharge the water to the storage tank for the distribution pipes within the town.

Samples of pipe scrape were collected in sterile bottles with the aid of sterile lancet from each location and were taken to the laboratory for microbiological analysis at controlled temperature.

Serial dilution of the samples were carried out by suspending 1gram of pipe scrapings into a test tube containing 9ml of peptone water and diluted up to six folds dilutions.

Methods

Samples and sampling Technique

Samples of pipe scrape were collected randomly from Birnin kudu Water Treatment plant and other distribution channels within Birnin kudu town Jigawa state

Sampling preparation

Samples of pipe scrape collected were taken to the laboratory for microbiological analysis at controlled temperature 37°C. Serial dilution of the samples were carried out by suspending 1gram of pipe scrapings into a test tube containing 9ml of peptone water and dilute up to six folds dilutions.

Experimental Techniques

Enumeration and Isolation of Bacteria

Aliquots (1ml) of the 10⁻⁶ dilution samples (Pipe scrapings) were inoculated using spreader (spread method) into Winogradski medium and were incubated at 37°C for 1-3days. Viable colonies were counted using colony counter and expressed as CFU/ml/Sub-culture of the colonies were carried out using wire loop (streak method) and have been incubated at 37°C for 1-3 days. Distinct colonies were selected and cultured on slants as pure colonies for further investigation.

Characterization of Isolates

Isolates were characterize based on the following characteristic

Morphology: Gram Stain

A looful of organisms were placed on a clean microscope slide. A thin smear were also prepared on a clean microscopic slide. Heat fixation were carried out showing the slide in flame. The slide were flooded with crystal violet for immunities, the slide were rinsed up with water . A few drops of gram's loading were added to cover the smear and allowed to reacted for 30 seconds. The slide were decolorized with 95% ethanol and rinsed water. The slide were flooded with safranin and allowed to reacted for one minutes and rinsed with tap water, the slide were bloated dry and observed under oil immersion objective.

Identification of Bacteria

Isolated colonies were identified based on morphology and biochemical tests. Fawole and Oso, 1988

Laboratory Analysis

Winogradski media

Winogradski media were prepared, Composition of Winogradski medium is (g/L);

K ₂ HPO ₄	0.5
MgSO ₄ .7H ₂ O	0.5
CaCl ₂ .2H ₂ O	0.2
NaNO ₃	0.5
NH ₄ NO ₃	0.5
ammonium iron citrate	6.0

The pHs of the medium were adjusted to 7.2 and autoclaved at 121°C for 15 mins.

Biochemical Test

Catalase test

Small amount of bacterial colony were transferred to a surface of clean, glass slide which were allowed to dry using a loop, a drop of 3% H₂O₂ were on the slide and were mixed thoroughly. A positive result is the rapid evolution of oxygen (within 5-10 sec.) as evidenced by bubbling, while a negative result is no bubbles or only a few scattered bubbles.

Citrate test

To a sterile simon's citrate medium, a loopful of 24 hours old culture were incubated aseptically. Incubation was done at 37°C for 24 hours after which they were examined daily for turbidity for a period of 3 days. Turbidity indicates citrate utilization.

Indole production test:

A looful of the isolate were incubated in the sterile nutrient broth. Incubation were done at 37°C for 48 hours. After incubation, 0.5ml of Kovac's reagent were added and shake, this were examined after one minute. A red colour in the reagent layer indicates indole production.

III. RESULT

Table 1. LEVEL OF BACTERIAL COUNT

S/N	Sampling Area	No. of samples	Range count (cfu/g)	Average count (cfu/g)
1	Audu Bako way	1	5.8×10 ⁶ cfu/g-3.7×10 ⁶ cfu/g	4.6 ×10 ⁶ cfu/g
2	Gangare Area	1	4.7×10 ⁶ cfu/g-2.9×10 ⁶ cfu/g	3.9×10 ⁶ cfu/g
3	Zango quarters	1	4.2×10 ⁶ cfu/g-2.7×10 ⁶ cfu/g	3.4×10 ⁶ cfu/g
4	Service tank pipe 1	1	3.9×10 ⁶ cfu/g-2.2×10 ⁶ cfu/g	3.1×10 ⁶ cfu/g
5	service tank pipe 2	1	4.0×10 ⁶ cfu/g-2.5×10 ⁶ cfu/g	3.3×10 ⁶ cfu/g

Table 2. Morphological and biochemical characteristics of the Isolate

Sample E	Gs	Mor	Cat	Ind	Cit	Organism
E ₁	P	R	+	-	+	B subtilis
E ₂	P	R	+	-	+	B subtilis
E ₃	P	R	+	-	+	B cereus
E ₄	P	R	+	-	+	B cereus
E ₅	P	R	+	-	+	B subtilis

KEY: GS-gram stain CAT- catalase IND-indole MOR-morphology CIT-citrate

Table 3 Morphological and biochemical characteristics of the Isolate

Sample F	Gs	Mor	Cat	Ind	Cit	Organism
F ₁	P	R	+	-	+	B subtilis
F ₂	P	R	+	-	+	B cereus
F ₃	P	R	+	-	+	B subtilis
F ₄	P	R	+	-	+	B cereus
F ₅	P	R	+	-	+	B cereus

KEY: GS-gram stain CAT- catalase IND-indole MOR-morphology CIT-citrate

Table 4 Morphological and biochemical characteristics of the Isolate

Sample G	Gs	Mor	Cat	Ind	Cit	Organism
G ₁	P	R	+	-	+	B cereus
G ₂	P	R	+	-	+	B subtilis
G ₃	P	R	+	-	+	B subtilis
G ₄	P	R	+	-	+	B subtilis
G ₅	P	R	+	-	+	B cereus

KEY: GS-gram stain CAT- catalase IND-indole MOR-morphology CIT-citrate

Table 5 Morphological and biochemical characteristics of the Isolate

Sample H	Gs	Mor	Cat	Ind	Cit	Organism
H ₁	P	R	+	-	+	B subtilis
H ₂	P	R	+	-	+	B subtilis
H ₃	P	R	+	-	+	B subtilis
H ₄	P	R	+	-	+	B cereus
H ₅	P	R	+	-	+	B cereus

KEY: GS-gram stain CAT- catalase IND-indole MOR-morphology CIT-citrate

Table 6 Morphological and biochemical characteristics of the Isolate

Sample I	Gs	Mor	Cat	Ind	Cit	Organism
I ₁	P	R	+	-	+	B subtilis
I ₂	P	R	+	-	+	B cereus
I ₃	P	R	+	-	+	B subtilis
I ₄	P	R	+	-	+	B cereus
I ₅	P	R	+	-	+	B subtilis

KEY: GS-gram stain CAT- catalase IND-indole MOR-morphology CIT-citrate

Table 7: Frequency distribution

Isolate	Number of appearance (%)
<i>B. cereus</i>	11 (44)
<i>B subtilis</i>	14(56)

IV. DISCUSSION

Result shows that from all the sample collected from Audu Bako way of Birnin kudu town E₁ has highest colonies (5.8×10^6 cfu/g) when compared with the other sample collected from the same area. Similarly, in Gangare area of the same town the sample leveled F₁ contain highest number of bacterial colony count (4.7×10^6 cfu/g) than the other samples collected from the same area. This shows that conditions favorable for the growth of the microbes (bacteria) were available in these areas. The conditions includes Temperature and PH as described in the work of Hamilton(1994),who said temperature and PH are among the parameters that govern the bacterial growth. Furthermore, Sample collected from Zango quarters of the same town that is Birnin Kudu town the sample leveled G₁ recorded the highest number of bacterial colony in comparism to the rest of the samples collected

from the same area. The areas have recorded large number of bacterial colonies indicating the presence of the microbes in the area which are potential to be causing corrosion in water pipes which may finally cause considerable damage and deterioration of the system at large. This look similar to the statement made by Allison (2003), who says involvement of microorganism and microbial metabolite accelerate the deterioration of industrial water system producing considerable damages, and destruction of the industrial water system.

In the same vein the result obtain from the samples collected at Birnin kudu water treatment plant from service tank levelled H₁(3.9×10^6 cfu/g) and service tank pipe 2 levelled I₁ (4.0×10^6 cfu/g) which served as the main pipes that discharge water to storage tank for consumers distribution within the town had recorded highest colonies of bacteria than the rest of the pipes sample from the treatment plant in the study area. Bacteria was

detected in the sample this may be because microorganism are said to be found everywhere provided there are conditions favourable for their growth as it was revealed by Fawole et al (1998), who said Microorganism are ubiquitous in nature and grow at rapid rates in soil, water and air. They show extreme tolerance to varying environmental conditions such as acidic and alkaline PH, low and higher temperature. The impact of bacterial growth can be detrimental to both the operational process performance requirement of the system product.

V. CONCLUSION

This research confirms the association of metal bio corrosion with microbiological entities – especially bacteria. Two species of bacteria namely *Bacillus subtilis* and *Bacillus cereus* associated with corroded metals have been isolated and identified, and the result shows that there is a connection between the composition of bacteria and water quality. It is therefore recommended that modern machines are highly needed in the treatment plant for easier and faster identification of microbiologically influence corrosion (MIC).

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Performance of P1 bivoltine seed rearing at Adopted Seed Rearers (ASRs) level during spring in three different seed zones

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Abstract- The present studies on the performance of P1 bivoltine seed rearing of four different silkworm races on some of the economic traits by feeding S-1635 variety of mulberry showed that in absence of extension supervision support due to outbreak of Covid-19 pandemic outbreak to the Adopted Seed Rearers (ASRs) have harvested good cocoon yield/100 dfls, pupation % was also attained above the norms set for procurement of seed cocoons etc., Further, highest single cocoon weight (g) and shell % was found in FC₂ pure breed.

Index Terms- ASRs, Cocoon yield, Pupation %. Pure breed, S-1635,

I. INTRODUCTION

P₁ seed cocoons form the basic input for preparation of commercial silkworm seed. Considering the paramount importance the silkworm seed cocoon bears, it needs to be generated on scientific line by maintaining the racial characters, vigour and disease freeness. Quality of silkworms seed plays a vital role in the success of the silkworm crop at the farmers level. The main objective of the seed crop rearing is to address vital issues involved in silkworm seed organization and produce quality silkworm seed cocoons which conforms to the norms, quality and disease freeness (Raje *et al.*, 2011). As it is always proved that hybrid silkworm combinations performs better than pure races. So, we have to prepare hybrids for higher production under hard conditions. But the basic hybrid combination is the pure races. It is very much necessary to strengthen the base *i.e.*, pure races and it is indispensable to take extra care during P₁ seed rearing. If the performance of the pure races is not of quality level, then our hybrid will also be weak. So, to produce the good quality hybrids seed, it is necessary to take care the pure races properly as the strength of our hybrids is directly proportional to the health of pure races.

Traditionally in J&K (UT) silk farming is very old age practice and in India J&K is the only bivoltine region having congenial climatic conditions suited for conduct of bivoltine silkworm rearing. But due to lack of productive silkworm races suited to agro-climatic conditions prevailing in the J&K (UT) has been recognized bottleneck in boosting the silk cocoon production for the past many years. It is the need of the hour to identify the

season and region specific breeds of silkworms by understanding the adaptability of silkworm genotypes which are largely influenced by climatic factors (Vijayalakshmi *et al.*, 2014). Attempts have been made by several researchers to identify season/region specific breeds throughout the country (Gangwar, 2012 Senapati and Hazarika, 2014, Vijayalakshmi *et al.*, 2014). The success of sericulture industry depends upon numerous factors of which the impact of the environmental factors such as biotic and abiotic factors is of vital importance. Among the abiotic factors, temperature plays a major role on growth and productivity of silkworm, as it is a poikilothermic (cold blooded) insect (Benjamin and Jolly 1986. It is also known that the late age silkworms prefer relatively lower temperature than young age and fluctuation of temperature during different stages of larval development was found to be more favorable for growth and development of larvae than constant temperature. There are ample literature stating that good quality cocoons are produced within a temperature range of 22–27°C and above these levels makes the cocoon quality poorer (Krishanaswami *et al.*, 1973). In sericulture, it is known that various factors play a decisive role for the growth and development of silkworm for the production of quality eggs. Silkworm seed quality refers to richness of layings, egg viability, hatching uniformity and more importantly good rearing performance of the progeny (Ullal and Narashimhanna, 1981) and it depends on management practices *i.e.*, rearing temperature, humidity, nutrition, and genotype of the breed. The better rearing conditions, environment and nutrition during larval period may leads to higher fecundity by silkworm moths (Miller, 2005; Malik and Reddy, 2007; Smita *et al.*, 2015; Biram *et al.*, 2009; Hussain *et al.*, 2011).

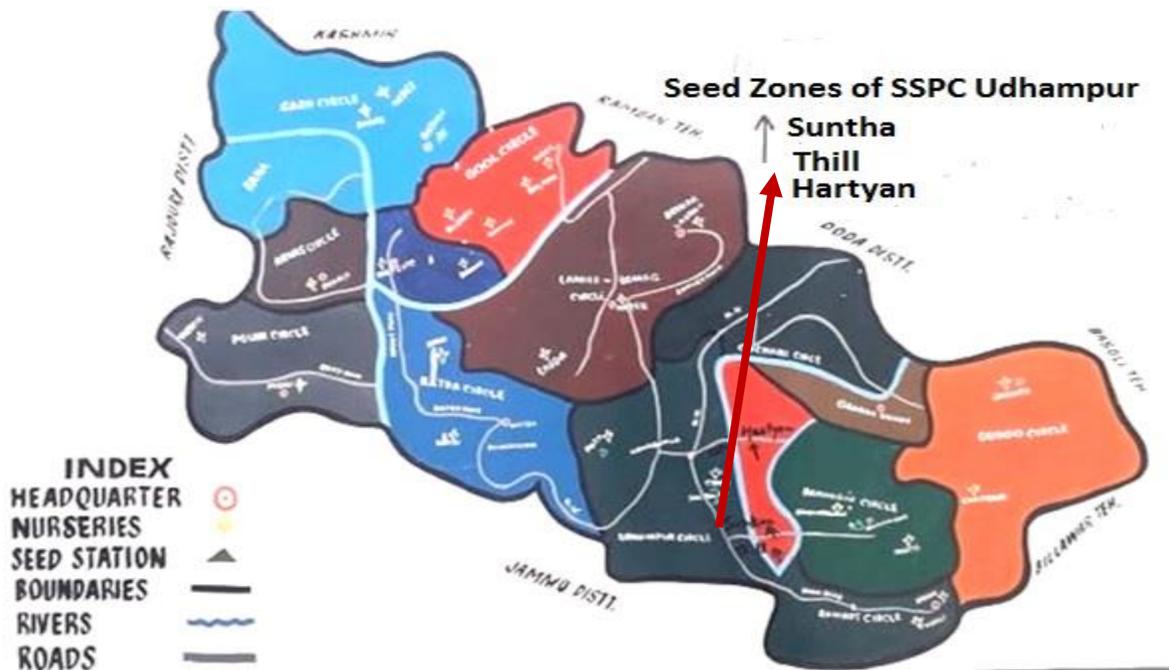
Objective of the study: To assess the performance of P₁ bivoltine seed rearing at Adopted Seed Rearers (ASRs) level during spring in three different seed zones

II. MATERIALS AND METHODS

The present study was undertaken at Silkworm Seed Production Centre, Udhampur during the year 2019-20. The leaves of S-1635 mulberry variety were selected and utilized for chawki rearing of all the four pure silkworms breeds viz., FC₁, FC₂, SH₆ and NB₄D₂ reared at the chawki rearing centre of SSPC,

Udhampur. Leaf harvesting is carried out by plucking individual leaf during cooling hours of the day which is 45 days old from the well established chawki mulberry garden and the same was preserved with wet gunny cloth to avoid drying of leaves. These fresh leaves were chopped and used for feeding to the chawki silkworms. Disease free laying of the silkworm were obtained from P2-Basic Seed Farm, Dehradun (SH₆ & NB₄D₂) and Silkworm Seed Production Centre, K.R. Nagar (FC₁ and FC₂) and raised on fresh mulberry leaves of improved mulberry genotype S-1635 as per the rearing technology for silkworm rearing advocated by Dandin *et al.*, (2000). During this period, chawki worms were fed three times a day *i.e.*, 6.00 A.M, 2.00 P.M and 10.00 P.M as per the quantity recommended. A Thermo-Hygrometer was used to record the temperature and relative humidity near the larval bed. A bed disinfectant powder prepared by grinding Lime and Vijetha

was dusted on the worms when the chawki worms were settled in the moult and come out of the moult as per the recommendation of the dosage. Dead larvae if any, during the course of chawki rearing were immediately removed and discarded properly every day before feeding the chawki worms. After passing out of the 2nd moults chawki worms were distributed among Adopted Seed Rearers (ASRs) of three different seed zones *viz.*, Suntha, Thill and Hartyan. After completion of the field rearing at ASRs level following economic parameters such as total ounces supplied to each seed zone among ASRs, total yield attained per ounce, average yield per ounce, income per farmer, pupation %, melting %, total larval duration, single cocoon weight (g), single shell weight (g) and shell % were recorded and value of the traits compiled for presenting the results of the findings in the form of graphs-(1-5).



Map of the Udhampur district depicting the P1 seed zones of SSPC, Udhampur

III. RESULTS AND DISCUSSION

The results of the present studies showed that the hatching percentage was recorded more than 90 % in all the pure breeds (Fig-1) and the larval and moulting period was also normal it showed that the chawki rearing was carried out controlled environmental conditions (Fig-2). Highest average cocoon yield was recorded in SH₆ (51.17 kg/100 Dfls) followed by NB₄D₂, FC₁,

& FC₂, respectively (Fig-3). Highest pupation percentage was found in NB₄D₂ and lowest was recorded in FC₂ (81.19 %) (Fig-4). The highest single cocoon weight was recorded in the race FC₂ (1.8g) over rest of the race. Swamy (1999) reported that the highest single cocoon weight was recorded in P2D1 (1.38 g). Chattopadhyay *et al.*, (1992) reported that the highest single cocoon weight was recorded in OS-616 (1.27 g). The maximum shell percentage was found in the FC₂ (20.27%) and the minimum shell percentage was recorded in SH₆ (19.28%) (Fig-5).

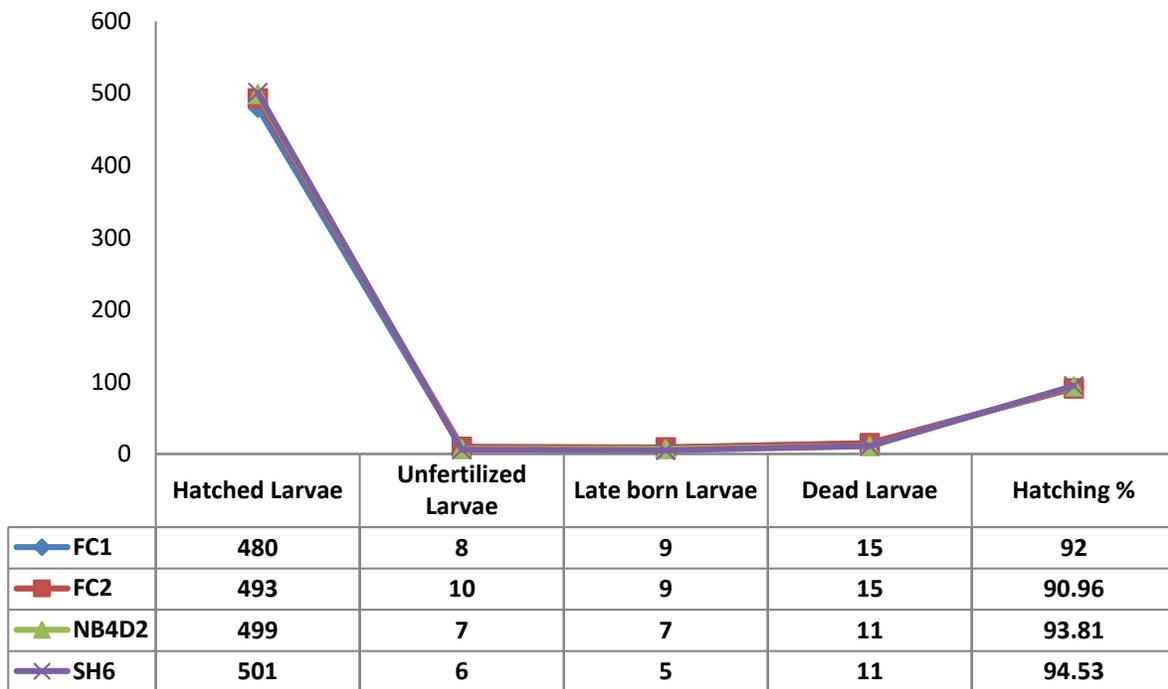


Fig 1. Chawki performance on no. of larvae hatched, unfertilized, late born, dead and hatching %.

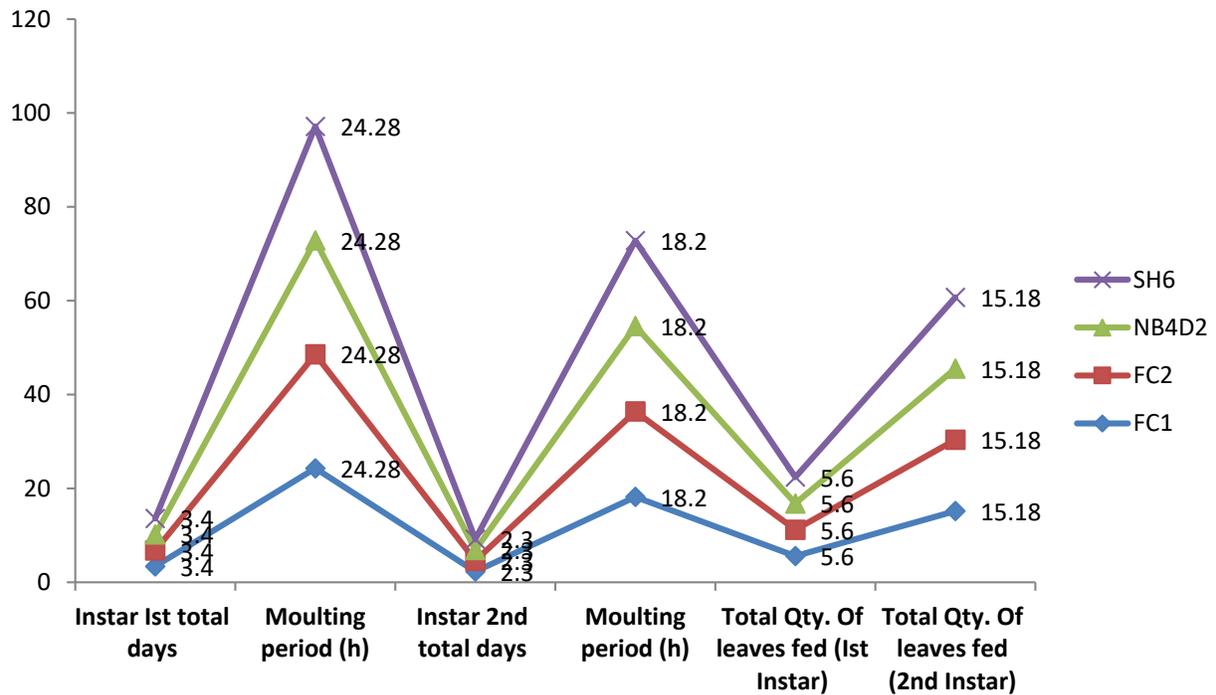


Fig 2. Chawki performance on total larval and moulting period and quantity of leaves consumed.

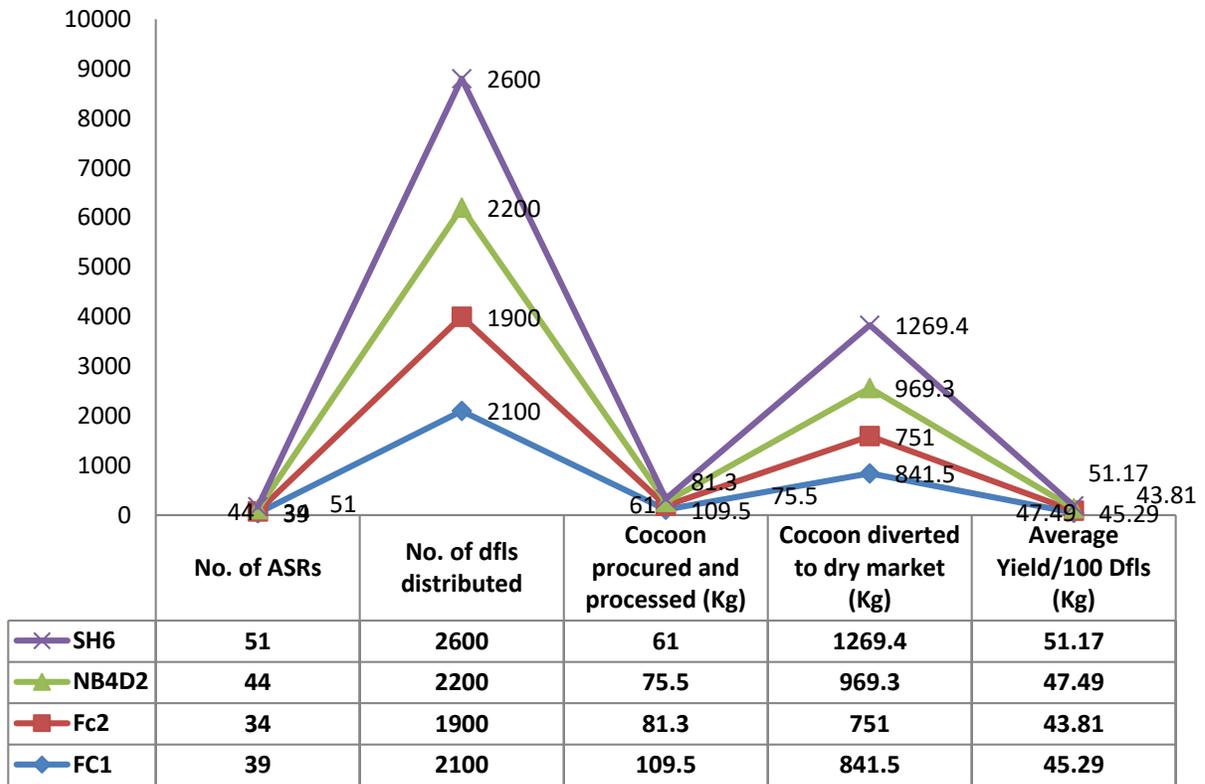


Fig 3. Performance of P1 bivoltine seed rearing of four pure breeds.

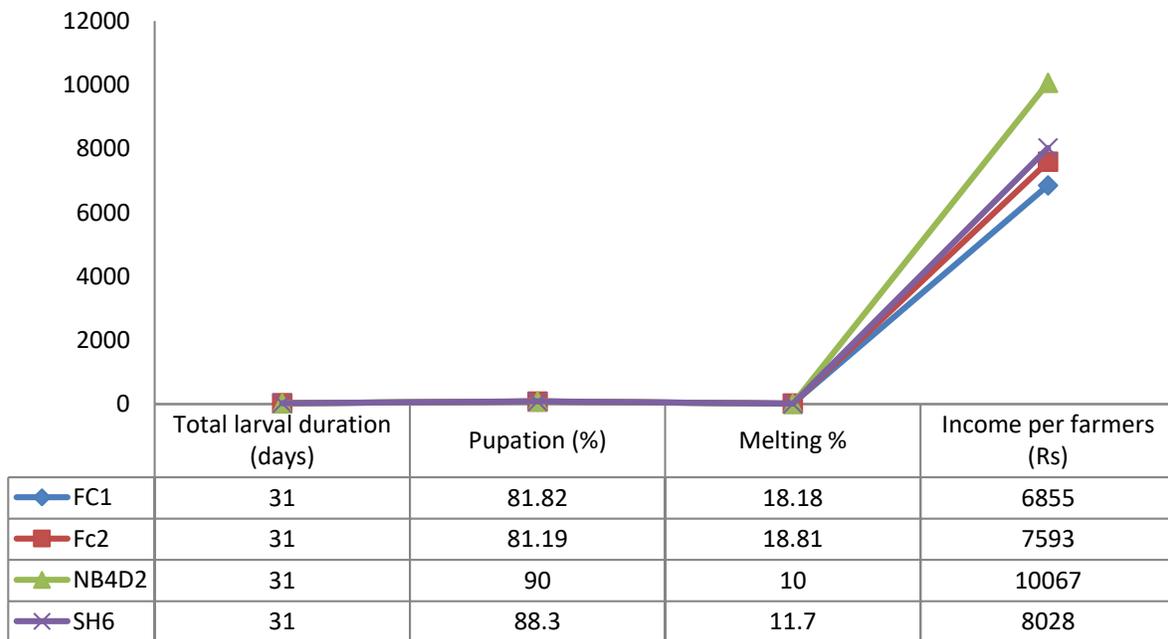


Fig 4. Performance of P1 bivoltine seed rearing of four pure breeds total larval duration, pupation %, melting % & Income per farmer per crop (Rs).

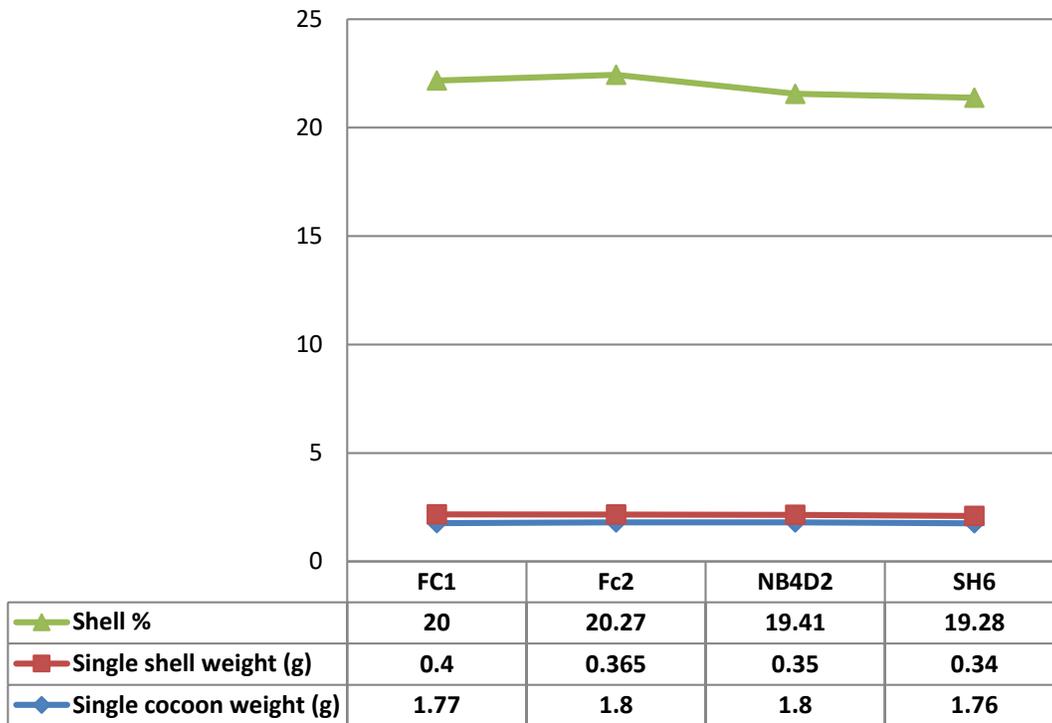


Fig 5. Performance of rearing parameters on single cocoon weight (g), single shell weight (g) and shell % of four pure breeds.

IV. CONCLUSION

The present study showed that the performance of four different breed of silkworms was better even during lack of supervision due to Covid-19 pandemic outbreak as the field functionaries unable to monitor the P1 seed crop rearing in three seed zones. Further, it shows that ASRs are well aware know how to conduct the seed rearing even under lack of extension support.

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The Impact of Social Media Network Sites on Academic Success of Students: Special Reference to Advanced Technological Institute, Sammanthurai

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Abstract: Social Media Network (SMN) becomes one of the greater influences on lifestyle and habits of teenagers which affects the educational environment and performance. There are different arguments about the possible effects of SMN on students' academic performance. Studies show that it quite appropriate for teachers and students to use social media to socialize by this means for academic purposes. Studies on impact of SMN on academic performance among students of Advanced Technological Institute (ATI) is hard to find in academic literature. Therefore, this study examines the use of SMN on academic performance among students of ATI. Self-administrative questionnaire is used to collect data from 148 randomly selected students in different courses in the ATI - Sammanthurai. The respondents are classified into four categories (Non, light, medium and heavy users) based on average time spent in SMN sites and apps. The students' academic performance is evaluated through Grade Point Average (GPA) of respective students in their study programme. The ANOVA statistical technique is used to find the impact of SMN on students' academic performance by comparing the mean GPA of groups of respondents. The study finds that the use of SMN has a significant impact on the students' academic performance. The light users get the highest GPA than all other groups. Non-users also get a higher GPA than medium and heavy users. The mean GPA differences between the non-users and the medium users are not statistically significant. The light users spend less time relatively other groups of users. The light users may utilize the SMN for educational purposes. However, the medium users utilize SMN for entertainment as well as educational purpose. The heavy users are spending much of their study time on SMN which leads to reduce in study time and adversely impact on their academic performance. This study concludes that the reasonable use of SMN helps to increase academic performance of the ATI students.

Keywords: *academic performance, ATI, Education, Social media network*

INTRODUCTION

Today, it is very common to talk about Social Media Networks (SMN), both in teenagers and in the majority of people at different ages. The colleges modify their classrooms in digital nature that demand a new type of education. The colleges grow under the influence of audiovisuals and network with new technological tools (social media networks, blogs, video platforms, etc.) which have given the ability to create, share, inform and communicate academic information that become an essential element in their educational lives. SMN sites, such as Facebook, Google+, twitter, YouTube, Forums, LinkedIn, WhatsApp, Slide Share and Myspace are the most popular places for these students to spend their time, and are the primary focus of this study (Flad 2010). Facebook has become common among college students. They spend many hours on games and applications till late-night, rather than studying or revisioning. This behavior could affect the students' marks and concentration during their class. Young people have fully incorporated their lives with new network technologies and internet applications via mobile devices and computers which have become the ideal space for exchanging information and knowledge in fast, simple and comfortable manner. Teachers can take advantage of this situation and the willingness of students to use social networks to incorporate into teaching. The young people think that surfing the Internet or the use of social networks is not a waste of time, because they are integrating

technological competence and communicative as they are very essential for the modern world. Nowadays, social networks are becoming one of the greater influences on life style and habits of people, mainly teenagers which offering advantages and disadvantages within the educational environment due to excessive use of this website.

This social media network consists a variety of functions, based on maintaining a virtual relationship with those people with whom one has lost direct contact. Considering that there are people in our life with which we would like to continue to retain any closeness, whether they are friends, family, colleagues or acquaintances, that is why once a connection is established with them on Facebook may be in permanent contact. According to Baran (2010) cited in Ahmed (2011) though there are negative perceptions about the possible effects of social network on students' academic performance, some studies showed that students found it quite appropriate for a teacher to use Facebook, and for teachers and students to socialize by this means. Social networks, communication styles and learning performance in a computer supported collaborative learning community use social media network (Divjak & Peharda 2010).

As social media sites continue to grow in popularity, it is premise that technology is a vital part in today's student success equation. Ranaweera, et al, examined the usage and implications of social networking sites (SNS) among Univotec students. Data were collected from a random sample of students at University of Vocational Technology in Rathmalana, during the second semester of 2014. This descriptive, exploratory research study drew a random sample of males and females, covering all subject streams, who were administered a student perception questionnaire on how social media affects Univotec students and find there is a positive relationship. A study was conducted by Habes, Alghizzawi, Salloum and Ghani (2018) to highlight the impact of social media on students in the higher educational universities and its impact on the students' academic performance. Social media has become one of the most popular means of communication due to its ability to deepen the conviction of the recipient and to increase his knowledge and trends. The study indicated that a large number of university students are using social media with more focus on Facebook, which in turn negatively affect their academic results.

A research study was conducted to examine the influence of Social Media and Academic Performance Of students in University of Lagos. Research findings showed that a great number of students in University of Lagos, are addicted to social media. To this end, the researcher recommended that social media should be used for educational purposes as well; Social Networking Sites should be expanded and new pages should be created to enhance academic activities and avoid setbacks in the students' academic performance; and Students should be monitored by teachers and parents on how they use these sites This is to create a balance between social media and academic activities of students to avoid setbacks in the academic performance of the students.(Peter, 2014)

There are different arguments about the possible effects of SMN on students' academic performance. Studies show that it quite appropriates for teachers and students to use social media to socialize by this means for academic purposes. Study on impact of SMN on academic performance among students of Advanced Technological Institute (ATI) is hard to find in academic literature. Therefore, this study examines the use of SMN on academic performance among students of ATI. In other words, does spending time to access social media network site on personal computer or mobile devices impacts on study time which leads to a significant impact on students' academic performance. The academic performance is measured by overall GPA of the student.

Methodology

This research is designed to test the impact of using social network sites on student academic performance in their course of studies. The study is performed through the collection of quantitative data, which then analyzed using computerized statistical package. For this research, it selects a group of respondents, collect data, and analyze the data to answer the research question. Questionnaire technique has been used to collect data from the clustered sample. As such, ATI Sammanthurai is selected and

randomly choose 148 students from different courses conducted in the ATI. This research is an appropriate investigation tool for making generalized interpretations about a large group of people based on data collected from a smaller number of individuals from that group. The students' academic performance is evaluated through GPA taken by students in their study programme at ATI Sammanthurai. The independent variable is time spent on social network sites. Based on time spending on social network sites, the students are grouped. This data is taken from the respective students through questionnaire during the class. However, the GPA of respective students are taken from their examination database at the ATI. This procedure of getting data adds validity for the data and study.

In order to study the effect of Social Media Network Sites on academic performance of the students at ATI, the students are firstly classified into four categories on the basis of the average time spent in hours per week on accessing Social Media Network sites. The first group is comprised of those students who do not have account on any Social Network sites and or are not using these sites regularly. The second group is the light users who spent time between 0 to 7 hours per week i.e. they are spending less than 1 hour per day. The third group is the medium users who spent time between 8 to 14 hours per week, i.e. they are spending more than 1 hour and less than 2 hours per day. The fourth group is those who spent more than 14 hours per week i.e. spending more than three hours per day. They are labeled as heavy users.

This study has used SPSS to perform the statistical analysis. The questionnaire is analyzed using descriptive statistical techniques. Descriptive statistics is another statistical technique which is used in this study to define the mean, minimum value, maximum value, and standard deviation for relevant variables considered. The key research question is answered using ANOVA test as statistical technique. This study uses this technique to find the impact of using social network site on students' performance by comparing mean of GPA of groups of students which are grouped based on time spent on it. This study is intended to bring attention to and awareness of the impact of using social network site on students' academic performance.

Results and Discussion

This section presents and interprets the output generated by SPSS 16.0 from data collected for this survey. The total number of respondents in the sample include is 148 students. Among them 32 (6 male and 26 female) students do not use any social network sites which represent 21.6% of the sample. 74 (29 male and 45 female) students are light users which represent 50.0% of the sample. 28 (17 students and 11 female) students are medium users which represent 18.9% of the sample. 14 (11 male and 3 female) students are heavy users which represent 9.5% of the sample.

From the sample of students, the variable time spent on social network sites gives mean value of 5.28 hours with standard error of 0.40. At 95% confidence level the mean time of the student's lies between 4.4895 to 6.0780 hours per week. But there is a 5% change to the mean time not lies within the range. Standard deviation of 5.89 hours, the range between 0 and 18 hours per week. The dependent variable GPA gives mean value of 2.0663 with standard error of .07337. At 95% confidence level the mean GPA of the student's lies between 1.9213 and 2.2113. But there is a 5% change to the mean time not lies within the range. Standard deviation of .89257, the range lies between .29 and 3.83.

Statistical Hypothesis

H_0 : Student's GPA of between groups are equal ($\mu=\mu$)

H_1 : Student's GPA of between groups are not equal ($\mu\neq\mu$)

Research Hypothesis

H₀: Use of Social network sites are not significantly affect the students' performance

H₁: Use of Social network sites are significantly affect the students' performance

For the analysis descriptive statistics of each group formed based on time spent on SMN, the overall mean GPA is 2.0663, standard deviation of 0.89257, with standard error of 0.07337 and at 95% of confidence interval for mean GPA between 1.9213 and 2.2113. The non-users' mean GPA is 1.9653, standard deviation of 0.68570, with standard error of 0.12122 and at 95% of confidence interval for mean GPA between 1.7181 and 2.2125. The light-users' mean GPA is 2.4618, standard deviation of 0.81544, with standard error of 0.09479 and at 95% of confidence interval for mean GPA between 2.2728 and 2.6507. The medium-users' mean GPA is 1.7004, standard deviation of 0.80962, with standard error of 0.15300 and at 95% of confidence interval for mean GPA between 1.3864 and 2.0143. The heavy-users' mean GPA is 0.0986, standard deviation of 0.46776, with standard error of 0.12501 and at 95% of confidence interval for mean GPA between .6685 and 1.2086.

The ANOVA test help to find the initial differences between groups. ANOVA output. Which used to compare mean differences between groups of the sample. The F-statistic is 19.194 in degree of freedom 3, The Sig value is 0.00. it rejects null hypothesis i.e. there is a significant evidence to reject that students' average GPA are different between groups, so it comes to the conclusion that the average GPA of students' are statistically significantly different. So student's time spent on SNS impact on students' performance.

Further to find out which group are different from each other group, the post hoc Tukey HSD multiple comparison test used. The mean differences at 0.05 significant level between non user and light user is -0.49644 and sig value is 0.013. So, it says that the mean difference is significant. The groups between non users and medium users is 0.26496 and sig value is 0.537. So we can say that the mean differences is not significant. The groups between non users and heavy users is 1.02674 and sig value is 0.000. So we can say that the mean differences is significant. The groups between light users and medium users is 0.76140 and sig value is 0.000. So we can say that the mean differences is significant. The groups between light users and heavy users is 1.52319 and sig value is 0.000. So we can say that the mean differences is significant. The groups between medium users and heavy users is 0.76179 and sig value is 0.014. So we can say that the mean differences is significant.

Conclusions/Recommendations

The use of social network sites relatively impacts on students' academic performance. When comparing the mean GPA of each group, the light users get higher GPA than other groups. Non users also get high GPA but relatively less than light users and higher than medium users and heavy users. The difference between light users and non-users is significantly different. The reason may be they are spending reasonable amount of time on social network sites, as such they would get an opportunity to use SNS for their educational purpose which leads to academic performance. Meanwhile, non-users are utilizing traditional way of getting knowledge for their academic performance. The mean GPA differences between the non-users and the medium users are not statistically significant. The reason could be the medium user use SNS for educational purpose but not same as light users. The light users spend less amount of time relatively medium users as such they can utilize the time for traditional way of learning, but the medium users spend less time for studies in traditional way of learning relatively with the light users and the non-users of SNS. The heavy users are spending much time of their study time on SNS which leads to impact on study time then adversely impact on academic performance. When analyzing the gender differences of the students also seem to give significant differences in academic performance. Female students get higher GPA than Male students. The reason could be female student spend less time relatively to male students which might lead to the academic performance of the female students.

The study conclude that the use of social media network sites help to academic performance of the students but the students have to use the sites with care only for learning purpose with reasonable time which could not impact on their traditional learning hours. If the students use more than reasonable time it may lead to adversely impact on their academic performance.

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Death Penalty from The Perspective of Human Rights in Indonesia

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Abstract- Pros and Cons regarding death penalty from the perspective of human right in Indonesia are still going on. Some argued the death penalty does not violate human rights because the perpetrators have violated the human rights of victims and human rights of the community, while others convinced that the death penalty violates human rights since it revokes the right to life of a person. This paper aims to review the death penalty from the perspective of Human Rights in Indonesia by applying normative law theory vis a vis current practice. The sources of data were collected from library research, web search and other primary, secondary and tertiary legal materials. The study confirms that death penalty must be seen from the perspective of the Universal Declaration of Human Rights (UDHR), in that there are several articles that do not allow the death penalty. The constitution of the Republic of Indonesia also highlights that every person has the right to live and has the right to defend his life. Thus, capital punishment does not contradict the Indonesian Constitution.

Keywords: death penalty; human rights; the Indonesian Constitution; normative law theory.

1. INTRODUCTION

Human Rights locally called Hak Azasi Manusia ((HAM) becomes two sexy words that were claimed to be important in the democratic nations, like Indonesia. However, the understanding of HAM itself often varies from ordinary people to those considered to be very understanding of human rights. This is not surprising as HAM is defined too general as it relates with natural rights and contains moral messages that require every person both individually or in groups even the authorities / government (state) must respect and protect these human rights.

Whilst the discussion and the interpretation of HAM are still varying from one and another, human rights themselves have been included in various international charter and conventions and also have been included in the legislation in force in Indonesia. In other words, the human rights message has been transformed into a legal message because it has been normalized, namely through legislation. Thus, the conception of human rights contained in various laws and regulations will function as a binding norm, so it must be obeyed and implemented.

The legal function governing human rights is to protect individual from arbitrary actions or deeds, imbalances and uncertainties, and so on from other parties. In the preamble of a universal declaration of human rights approved and announced by UN General Assembly Resolution No. 217 A (III) dated December 10, 1948, it was mentioned considerations of human rights as follows.

1. consideration of recognition of inherent dignity and equal rights is not alienated from all members of the human family, justice and peace in the world.
2. consideration of the neglecting and looking down on human rights associated with cruel acts which create a feeling of anger in the conscience of humanity and the formation of a world where humans will taste the enjoyment of freedom from fear and lack has been stated as the highest aspiration of commoners.
3. Consideration of human rights that need to be protected by legal regulations so that people are not forced to choose rebellion as a last resort to oppose despotism and colonialism (Azra, 2003).

In the 1945 Constitution of the Republic of Indonesia, especially in the preamble and in the body of the constitution, it was stated clearly that a nation has right to independence or freedom apart from all forms of colonialism not only apply to the Indonesian people only, but to all nations in the world (opening paragraph I) and what is important for the Indonesian people is that stated in (paragraph IV opening) that the goal of the Indonesian government towards the international world is "participating in carrying out world order based on independence, eternal peace and social justice", and what is unique to the state and nation of Indonesia is that independence and Indonesian nationality in a rule of law based on "Pancasila"

Regarding human rights, the 1945 Constitution seems have no detail affirmation. This is not surprising considering that the problem of the 1945 Constitution was compiled at the end of the Japanese occupation in an atmosphere of urgency which was very limited time to allow human rights to be stated in details. Human rights were formulated further in 1949/1950. As a consequence, the opening of the 1945 Constitution contains the following principles: (1) Indonesian independence is actually a blessing from God's grace; (2) The entire Indonesian people and the state and nation are protected; (3). The state promotes public welfare and enlightens the life of the nation; (4). The state participates in carrying out world order based on independence, eternal peace and social justice; and (5) The Republic of Indonesia is a law based on Pancasila. Whereas the rights and obligations stated in the 1945 Constitution, namely: (a) Article 27, paragraph (1) states that "all citizens are at the same position in law and government. And it is obligatory to see the law and government without exception, Paragraph (2) states that: "every citizen has the right to work and a decent living for humans"; (b). Article 28 states that "freedom of association and assembly shall express thoughts both orally and in writing and others shall be stipulated by law"; and (c). Article 29 paragraph (2) states that "the state guarantees the freedom of the population to embrace their respective religions and to worship and their beliefs".

The brief description above seems to be unclear in explaining public regarding the death capital punishment form the perspective of human rights, this is shown from the facts of the growing opinions whether or not the death penalty does or does not violate human rights. Some argue death penalty does not violate human rights because the perpetrators have violated the human rights of the victims and the human rights of the community. While the rest argue that death penalty is considered to violate human rights because it revokes the right to life of a person. Due to this reason, the objective of this study is to review the death penalty from the perspective of Human Rights in Indonesia by applying normative legal research focusing on an inventory of positive law, principles and doctrine of law, legal discovery, systematic law, synchronization levels, comparative law and legal history. However, before detail of overview is discussed, the following section will highlight relevant literature associated with the scope of criminal law, death penalty and human rights in section 2. Section 3 deals with detail results and discussion addressing death penalty from the perspective of human rights. Finally, concluding notes are drawn in Section 4.

2. LITERATURE REVIEW

2.1 Criminal Law

The word 'criminal' comes from the Dutch (*Starf*), which basically can be interpreted as suffering (misery) intentionally dropped on someone who has been proven guilty of committing a crime. There are several experts who give opinions regarding the definition of criminal. Vanhamel, for instance, defines criminal is a special suffering that has been inflicted by the authority that has the authority to impose a criminal on behalf of the state as the responsibility of public law order for a violator, which is solely because the person has violated a rule of law which must be upheld by the state. Simons, further stated that criminal is a suffering which by criminal law has been associated with violation of a norm, which by a judge's verdict has been handed down for a guilty person (see, www.pengertianahli.com).

Moeljatno (1993), however, detail the definition of criminal law as the part of the whole applicable law in a country, which establishes the basics and rules for: (a) determining which actions should not be carried out, which are prohibited, accompanied by threats or sanctions in the form of certain penalties for anyone who violates the prohibition; (b) determining when and in what ways those who have violated the restrictions can be imposed or convicted as threatened; and (c) determining by how the imposition of criminal acts can be carried out if there is a person who is suspected of violating the prohibition.

Criminal Law as a law that regulates acts that are prohibited by the Act and results in the imposition of penalties for those who commit them and fulfil the elements of the acts mentioned in the Criminal Law. Such actions are prohibited in the Criminal Code, Corruption Law, Human Rights Law and so on. Criminal law is the law that regulates what acts are prohibited and provides penalties for those who break them. While criminal acts are prohibited acts. Moeljatno (1993) pointed out that a criminal act is an act that is prohibited by a legal regulation which prohibits criminal sanctions in the form of certain penalties, for those who violate the prohibition.

It can also be said that a criminal act is an act that is prohibited and threatened with crime, as long as it is necessary to remember that the prohibition is aimed at the act, while the criminal threat is directed at the person who caused the event. Between prohibitions and criminal threats there is a close relationship between the incident and the person who caused the incident. To express the close relationship, words of action are used, that is, an abstract understanding that refers to the two

concrete conditions. The first is the occurrence of a certain event and the second is the existence of the person who caused the event. Roeslan Saleh (1981) put forward his opinion regarding criminal acts, namely as acts which by criminal law are stated as prohibited acts. Thus, the criminal act only shows the nature of the prohibited act and is threatened with criminal action (Bambang Purnomo, 1976). So criminal acts are separated from criminal liability separated by mistakes. Another case *strafbaarfeit* includes the notion of crime deeds and mistakes.

Whereas according to the provisions of Article 10 of the Criminal Code there are several types of sentences that can be imposed on someone who has committed an act of crime, in which the sentence to be imposed can be in the form of:

a. Criminal principal.

1) Criminal death

Many countries have abolished the death penalty. These countries include the Netherlands since the seventeenth century. In Indonesia the death penalty is sometimes still applied for some sentences although there are still many pros and cons to this punishment.

2) Criminal imprisonment

Criminal imprisonment is one form of criminal deprivation of liberty. There are several systems in imprisonment, namely, (1) *Pensylvanian System* that is convicts according to this system are included in separate cells, he must not accept guests from both outside and fellow prisoners, he must not work outside the cell, the only job is to read the sacred books given to him. Because the implementation is carried out in cells, it is also called the *Cellulaire System*. (2) *Auburn System* that is at night he is put in a cell individually, during the day he is required to work with other prisoners, but may not talk to each other, usually called the *Silent System*; and (3) *Progressive System* that is method of carrying out criminal activities according to this system is gradual, usually called the *English / Ire System*.

3) Criminal confinement and substitute confinement

Criminal confinement is also a form of criminal deprivation of liberty, but this confinement is in some ways lighter than imprisonment. This consists of criminal substitute confinement as a substitute for criminal fines that are not paid by the convicted person. A substitute imprisonment can also be imposed if the convict does not pay the estimated price of the booty that was not delivered by the convicted person; and penalty fines which are penalties in the form of a person's obligation to develop a legal balance or atone for his sin by paying a certain amount of money. If the convict is unable to pay the fines imposed on him, it can be replaced with imprisonment. This criminal is called a substitute confinement crime. The maximum of a substitute confinement is 6 months and may be 8 months in the event of repetition, sharing or application of article 52 or article 52 a of the Criminal Code (Teguh Prasetyo, 2014).

b. Additional Crimes

Additional crimes consist of revocation of certain rights, expropriation of certain items, and announcement of the judge's decision.

The purpose of punishment can be sought by us on the basis of justification for punishment or conviction. Regarding the basis of justification for criminal prosecution, there are two theories, namely based on absolute theory, relative theory, and combined theory. According to absolute theory, the goal of punishment lies in the criminal law itself. Whoever commits a criminal offense must be sentenced. While according to relative theory, the purpose of punishment is to: (a) prevent crime from happening; (b) to scare so others don't commit crimes; (c) improve the person who commits a crime; and (d) provide protection to the public against crime. According to the combined theory, which is a combination of absolute and relative, the purpose of criminal impose is because the person committed a crime and so that he does not commit another crime (Siti Soetami, 1992).

2.2. Death Penalty

The death penalty is a crime that has been formulated in the Indonesian criminal code since January 1, 1918, article 10 of the Criminal Code mentions a basic crime, which in 1870 was abolished in the Netherlands, whereas the death penalty itself means a criminal sentence for a serious crime that requires a convicted person to die, in the form of hanging, shooting, etc. In the Indonesian Penal Code, this have been written and has been promulgated as one of the criminal sentences (Andi Hamzah, 1985).

Capital punishment is part of the types of criminal acts that are based on Indonesia's positive criminal law. This form of crime is a sentence carried out by taking someone's life that violates the provisions of the law. This criminal is also the oldest and most controversial punishment of various other criminal forms. The aim was to carry out and carry out the death penalty so that the public would pay attention that the government did not want any disturbance to the security that was feared by the public.

Actually, capital punishment in Indonesia has been going on since the previous ancestors, namely since the kingdom, although in that period has not been enacted as a whole only partially used it, and during the Dutch colonial period began the capital punishment was strengthened and fully introduced by the Dutch government to the Indonesian people with promulgates and includes capital punishment in the law.

From this, the Indonesian Penal Code has listed the capital punishment which if it has been determined as a basic crime even though it is currently being re-processed by the government for the determination of the death penalty as a basic crime, but in actual review the death penalty may need to be due to being able to deter and suppress and intimidate follow the villain, and relatively cause no pain if carried out appropriately (Andi Hamzah, 1985).

Based on historical, capital punishment is not a relatively new form of punishment in Indonesia. This criminal has been known since the days of the kingdoms. This can be proven by observing the types of criminal according to customary law or the law of the ancient kings, for example: (a) Stealing is sentenced to be chopped off, as practiced in Aceh; (b) Capital punishment is carried out by cutting up the flesh from the body (Sayab), pounding the head (sroh), decapitating and then stabbing his head with a stick (tanjir), and so on.

The purpose of giving the death sentence is actually intended to provide a deterrent effect and to give the right punishment for the perpetrators of serious crimes or even gross human rights crimes, which may affect other individuals so that they think longer in committing serious crimes. From the existence of capital punishment, it is possible to produce more results than other crimes that may be overlooked by many perpetrators of criminal acts.

2.3. Human Rights

Rights are normative elements inherent in every human beings. In their application, there are in the scope of equality rights and freedom rights related to their interactions between individuals or agencies. Rights is also something that must be earned. The issue of human rights is something that is often discussed especially in the current era of freedom. Human rights have been more attention in the reform era than in the era before the reform. Keep in mind that in terms of fulfilling rights, we live not alone and we live socializing with others. We must not violate other people's human rights in our efforts to obtain or fulfil our human rights. In other words, the freedom of our human rights is limited by the human rights of others.

Human rights are the basic rights that humans have had since humans were born. Human rights can be formulated as rights inherent in our nature as humans, which if there were no such rights, it would be impossible for us to live as humans. This right is owned by humans solely because it is human, not because of a gift from society or a gift from the state. So human rights are not dependent on the recognition of other humans, other communities or other countries, but the gift of God to us (Kaelan, 2002).

Human rights are basic rights possessed by humans, in accordance with their nature. In the opinion of Jan Materson (from the UN Human Rights Commission), in Teaching Human Rights, the United Nations as quoted by Baharuddin Lopa stressed that human rights are rights inherent in every human being, without which it is impossible for humans to live as humans. John Locke states that human rights are rights granted directly by God the Creator as natural rights. Article 1 of Law Number 39 Year 1999 concerning Human Rights states that Human Rights are a set of rights inherent in the nature and existence of humans as God's creatures and are His gifts that must be respected, upheld and protected by the state, law, the government and everyone, for the sake of honor and protection of human dignity (Mansyur Effendi, 1994).

Human rights exist and are inherent in every human being. Therefore, it is universal, meaning that it applies everywhere and for anyone and cannot be taken by anyone. This right is needed by humans in addition to protecting themselves and their human dignity is also used as a moral foundation in associating or dealing with fellow human beings. In each right inherent obligation. Therefore, in addition to human rights, there are also human rights obligations, which are obligations that must be carried out to uphold or uphold human rights.

On November 10, 1948, the General Assembly of the United Nations (UN) began to agree on a new agreement. Located in Paris, France, the Universal Declaration of Human Rights was issued. Originating from the first breakthrough, finally in 1950 began to be commemorated annually as Human Rights Day.

After the historic declaration was made, each country tried to declare their respective human rights. They are protected legally for their freedom in a country. In the declaration, there were at least 30 written and agreed human rights (see for details <https://internasional.kompas.com/read/2018/12/10/17055301/ini-30-macam-hak-asasi-manusia-menurut-pbb?page=all>). These include as follows : (a). born free and treated equally. We are all born free. We all have our own thoughts and ideas. We all need to be treated the same way. (b) Rights without discrimination. Everyone has the right to all rights and freedoms without any distinction, such as race, colour, sex, language, religion, political opinions or otherwise, national or social origin, property, birth, or other status. (c) Right to Life. We all have the right to live, and live in freedom and security. (d) Rights without slavery. No one will be detained in slavery or slavery practices; slavery and the slave trade were prohibited in all forms; (e) Be free from torture and degrading treatment. No one will experience torture or cruel, inhuman or degrading treatment or punishment. (f) Right to

recognition as a person before the law. Everyone has the right to be recognized everywhere as a person before the law. (g) Right to equality before the law. All are equal before the law and are entitled without discrimination to equal legal protection. All have the right to equal protection against any discrimination that violates this declaration and against any incitement to such discrimination.; (h) the freedom protected by law. Every person has the right to an effective remedy by a competent national court for actions that violate the basic rights granted to him by the constitution or by law. (i) Freedom from arbitrary arrest and alienation. No one has the right to put someone in prison without a good reason or send someone away from a country without reason. (j) Right to public hearings. Everyone has the right to full equality when in public. When someone stumbles on legal issues, he is entitled to get protection from the public. (k) Right to be presumed innocent, until proven guilty. There is no one to blame for doing something until proven guilty. When people say someone did something bad, they have the right to show that it is not right (defence). (l) Privacy rights. Every person has the right to legal protection against interference or attacks on him. They will get their privacy protection. (m) Right to freedom of movement. Everyone has the freedom to go to other regions, settle or travel anywhere; (n) The right to find a safe place to live. Everyone has the right to seek and enjoy freedom in other countries to be free from persecution. (o) Nationality rights. Every person has the right to citizenship and no one can lose his citizenship without cause; (p) Right to marry and have a family. Every adult has the right to marry and have a family if they want. Men and women have the same rights when they are married, and when they are separated. (q) Property rights. Everyone has the right to own something or share it. Nobody has to take someone's things without a good reason; (r) Freedom of religion and thought. Everyone has the right to freedom of thought, conscience and choice of religion. This right includes freedom to change his religion or beliefs, and freedom, either alone or in community with others and publicly or privately, to manifest his religion or beliefs in teaching, practicing, worshiping and being pious; (s) Freedom of expression. Everyone has the right to freedom of opinion and expression. This right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and without any limitations; (t) Right to general assembly. We all have the right to meet our friends and work together peacefully to defend our rights. There is no freedom for someone to force the rights of others to participate in certain meetings;(u) The right to democracy. We all have the right to take part in the government of our country. (v) Social security rights. Everyone as a member of the community has the right to social security and the right to realization, through national efforts and international cooperation and in accordance with their respective organizations and resources; (w) Right to work and as a worker. Every adult has the right to do work, with a fair salary for their work, and to join a union; (x) Right to rest and relax. Everyone has the right to relax and unwind, including restrictions on reasonable working hours and periodic paid holidays; (y) Food and shelter. Everyone has the right to a good life. Mother and children, parents, unemployed or sick, and everyone has the right to be treated when sick. One also has the freedom to choose food; (z) Right to education, right to participate in the cultural life of the community; right to a just world, and responsibility,

3. RESULTS AND DISCUSSION

3.1 Death Penalty

The implementation of capital punishment in Indonesia was originally carried out according to the provisions in Article 11 of the Indonesian Criminal Code which states that capital punishment is carried out by the executioner of hanging by tying the neck of the convicted with a snare on a hanging pole and dropping the board from under his feet. Because it was felt to be inappropriate, the article mentioned above was amended with the provisions of Staatsblad 1945 Number 123 and entered into force on August 25, 1945. Article 1 of the regulation states that deviates from what is stipulated in other laws, capital punishment is imposed on civilians (not the military), as long as it is not otherwise determined by the governor general to be carried out by shooting dead. The provisions for its implementation are detailed in Law No. 2 (PNPS) in 1964.

Based on the above information it can be concluded that the execution of the death penalty in Indonesia currently in force is carried out by shooting to death rather than by hanging the convicted person on gallows. Some of the most important provisions in the implementation of capital punishment are as follows: 1) Three days before the execution of the death penalty, the high prosecutor or the prosecutor concerned notifies the convicted person and if there is a wish of the convicted person to express something then the message is received by the prosecutor; 2) If the convict is pregnant must be postponed until delivery; 3) The place of the execution of capital punishment is determined by the Minister of Justice in the jurisdiction of the court of first level court concerned; 4) The Regional Police Chief concerned is responsible for its implementation; 5) The death penalty is carried out by police firing squad under the leadership of a police officer; 6) The Regional Police Chief concerned must attend the implementation; 7) Implementation may not be in public; 8) The funeral is left to the family; 9) After completion of the execution of the death sentence, the Prosecutor must produce an official report on the execution of the death sentence, which then copies of the decision must be included in the court's decision.

Indonesia itself is one of the countries that impose capital punishment. Based on the records of various International Human Rights Institutions, Indonesia is one of the countries that still applies the threat of capital punishment in its criminal law system. However, the largest countries in the world included in the retentionist country is the United States. Although this country

is one of the countries with the most echoes in calling for human rights protection in the world. But in reality, it still enforces the threat of capital punishment, also in military law.

The results of a number of studies on crime do not show a correlation between the death penalty with reduced crime rates. Some studies show that those who have been convicted of murder (also those who are planning) usually do not commit violence in prisons. Likewise, after leaving prison they no longer commit violence or the same crime. On the other hand, some experts criticize that a legal perspective cannot reach the legal complexity of criminal cases where the victim cooperates with the perpetrators of the crime, where the individual is the victim or the perpetrator of the crime, and where the person who appears to be the victim is in reality the perpetrator of the crime.

Capital punishment is a form of punishment that since hundreds of years ago has reaped the pros and cons. The pros and cons do not only occur in Indonesia, but occur in almost all countries that exist today. Every legal expert, human rights activist and others always rely on the pros and cons of opinions on the death penalty institution with logical and rational reasons.

The tendency of experts who agree with capital punishment is still maintained, generally based on conventional reasons, namely the need for capital punishment is needed to eliminate people who are considered endangering public or state interests and are deemed irreparable, while those who are counter to capital punishment usually make the reason for the death penalty is contrary to human rights and is a form of crime that cannot be remedied if after the execution is carried out an error is found in the sentence handed down by the judge. As for some experts and figures who support the existence of capital punishment are:

- a. Jonkers, supported the death penalty with his opinion that criminal reasons cannot be withdrawn, if they have been carried out" is not an acceptable reason to declare "capital punishment unacceptable. Because in court a judge's decision is usually based on the right reasons (Andi Hamzah & A. Sumangelipu, 1985).
- b. Lambroso and Garofalo, argue that capital punishment is an absolute tool that must be present in society to eliminate individuals who cannot be repaired anymore. Individuals are certainly people who commit extraordinarily serious crimes (extra ordinary crime).
- c. Hazewinkel Suringa, argues that capital punishment is a form of punishment that is needed in a certain period, especially in the case of a transition of power that switches in a short time. The author of such a document is based on Suringa's opinion which states that capital punishment is a radical cleansing tool that at every revolutionary time we can quickly use it (Andi Hamzah & A. Sumangelipu, 1985).
- d. Barda Nawawi Arief, explicitly in a book stated that capital punishment still needs to be maintained in the context of the renewal of the National Criminal Code. His opinion stated: "that although the death penalty is maintained, it is mainly based as an effort to protect the community (so it emphasizes more or is oriented to the interests of the community), but in its application it is expected to be selective, cautious and also oriented towards the protection / interests of individuals (criminal acts). See Barda Nawawi Arief (2005).

Furthermore, whether or not the capital punishment is unconstitutional has actually been answered in the Constitutional Court's ruling on the Material Testing Application for Law Number 22 of 1997 Concerning Narcotics against the 1945 Constitution which was filed by four death row convicted narcotics cases through their legal counsel regarding the unconstitutionality of the death penalty stipulated in Act Number 22 of 1997 concerning Narcotics. Based on the decision of the Constitutional Court, it is expressly stated that the threat of capital punishment in Law Number 22 of 1997 concerning Narcotics is not contrary to the Constitution. By analogy, a conclusion can be drawn that capital punishment is not an unconstitutional act. Sounds of the Conclusions of the Constitutional Court Decision on the petition, which states: Provisions of Article 80 Paragraph (1) letter a, Paragraph (2) letter (a), Paragraph (3) letter a; Article 81 Paragraph (3) letter (a); Article 82 Paragraph (1) letter a, Paragraph 2 (letter) a and Paragraph (3) letter a in the Narcotics Law, as long as those concerning the threat of capital punishment, do not conflict with Article 28A and Article 28I paragraph (1) of the 1945 Constitution.

Based on this information, it can actually be clearly stated that capital punishment does not contradict the Constitution of our Country and still deserves to be maintained in positive criminal law. However, based on this decision, the renewal of criminal law related to capital punishment should be taken seriously in the future, as follows:

- a. Capital punishment is no longer a basic crime, but as a specific and alternative criminal offense;
- b. Death sentences can be sentenced to probation for ten years which if the convicted convict behaves can be changed to life imprisonment or for 20 years;
- c. Death penalty cannot be imposed on minors;
- d. Execution of capital punishment on pregnant women and mentally ill people is suspended until the pregnant woman gives birth and the death row inmate who is mentally recovered

So, based on the description of the opinion above, it can be emphasized that the supporters of capital punishment in modern times merely make capital punishment as an instrument to protect society and the State in both preventive and repressive forms. Repressive here is not making those who are governed vulnerable and weak like authoritarian rule which makes capital punishment as a tool to get rid of people who are in conflict with the authorities. In addition, in the formulation of the new National Penal Code, in the case of capital punishment, it must pay attention to the sound of the decision above.

Likewise, the opinions of experts and figures who contravene capital punishment are not insignificant, and they also rely on an argument on the basis of scientific thinking. A classic figure who is very well known for his vocabulary against capital punishment is an Italian national named Beccaria. Beccaria's reason for opposing capital punishment is a process that is carried out in a very bad way against someone who is accused of killing his own child (some time after the execution can be proven that the verdict is wrong). Likewise, stated by Ferri who is also an Italian national in matters against capital punishment, argues that in order to protect those who have the predisposition to a crime, it is enough to have a life sentence, there is no need for capital punishment.

Some reasons for those who oppose the death penalty include the following:

- Once the death sentence is imposed and implemented, there is no way to improve it if it turns out that in its decision the law contains a mistake.
- Death penalty is contrary to humanity.
- By imposing capital punishment, efforts will be made to improve the convicted person.
- If capital punishment is seen as an attempt to frighten potential criminals, then that view is wrong since capital punishment is usually carried out not in public.
- A sentence of death usually involves the compassion of the community, thereby inviting protest actions.
- In general, heads of state are more inclined to change capital punishment with limited or life imprisonment.

The reasons for those who tend to maintain the existence of the sentence or death sentence they express their opinions as follows:

- From a juridical point of view with the abolition of the death penalty, an important tool for the better application of criminal penalties is lost.
- Regarding the mistake of the judge, it can indeed happen however well the law was formulated. This mistake can be overcome by a stage of legal efforts and implementation.
- Regarding the reparation of the convicted person, of course it is intended that the person concerned is returned to the community well, if sentenced to life imprisoned it returns again to the life of the community.

The execution of death in Indonesia is not only based on the above information. For example, in Aceh executions can be carried out with a javelin, in Bali can be carried out by drowning into the sea, whereas in Batak tribes carried out with an alternative system where if the killer does not pay the wrong money then the execution can be carried out, and various other types of executions. By paying attention to the customs (adat) and customary law from Aceh to Irian showing us the death penalty is known by all tribes in Indonesia.

The application of criminal law by the Dutch government in the territory of Indonesia is enforced based on the enactment of "Wet Boekvan Strafrecht" which came into force on January 1, 1918. In this provision, capital punishment is determined as one of the main criminal types as stipulated in article 10. The execution of capital punishment is carried out with a sentence hanging as stipulated in article 10 of the Criminal Code. Then with Staatsblad 1945 Number 123 issued by the Dutch government, capital punishment was handed down by being shot dead. This is reinforced by Presidential Decree Number 2 of 1964 of 1964, State Gazette of 1964 Number 38 was then stipulated into Law number 5 of 1969 which stipulates that capital punishment is carried out by shooting dead convicts. In this case the execution must be attended by the Prosecutor (Head of the Public Prosecutor's Office) as the executor and technically the execution is carried out by the police firing squad.

In Indonesia, up to now there are still approximately 6 laws and regulations that still have threats, the death penalty includes:

- Criminal Code.
- Emergency Law No. 12 of 1951 concerning Firearms.
- Law No.15 of 2003 concerning Eradication of Terrorism Criminal Acts.

- Law No. 26 of 2000 concerning Human Rights Courts.
- Law No.35 of 2009 concerning Narcotics.
- Law No.5 of 1997 concerning Psychotropics.

It is worth noting that the execution of executions of death row inmates must be carried out after the court decision handed down is legally binding and the convicted person has been given the opportunity to submit a pardon to the President. The execution can be carried out first through fiat executives (President's approval). So it is clear here that capital punishment is basically and should be used as the ultimate means of punishment and can only be used against people who cannot be trained anymore and are felt to endanger the lives of the wider community and even the state.

Apart from the pros and cons above, there are also many debates among legal observers in Indonesia about capital punishment cases, many of them think that capital punishment needs to be carried out because of the existence of capital punishment is an attempt to negate people who can no longer be repaired and with the death penalty, the obligation to maintain them with imprisonment is also lost, so it can be concluded that the death penalty can reduce individuals who are not responsible for their actions. But many also consider capital punishment to be incompatible with the culture of Indonesian society because it is deemed to deviate from humanitarianism and deviate from human rights principles, because individuals who are counter to the death penalty assume capital punishment does not because individuals who contravene capital punishment assume capital punishment is not in line with the meaning of the crime itself which considers the crime is a rehabilitation of individuals who have committed a crime so that they can become better individuals without any forced loss of life, so the interpretation of the definition of criminal it is evident that the existence of capital punishment is contrary to the meaning of the crime itself. But, actually the death penalty is a good rule and is the result of thought of the punishment of the ancestors who have used the death penalty to resolve severe criminal cases and individual cases which have not been able to be corrected morally.

In the criminal law, it may include the death penalty but it is still in discussion whether the death penalty will be included as the main criminal or vice versa, as said by Prof. Sudarto that if criminal law is to be involved in efforts to overcome the negative aspects of community development / modernization and crime prevention, it should be seen in the overall relationship of criminal politics or social environment and must be guided by the integral of national development.

In other policies of Indonesian criminal law, a criminal act must be interpreted according to the actions and environment of the community and the suitability of the sentence imposed on the perpetrators of the crime, in fact the prison sentence is also a severe crime because it has robbed and narrowed the individual independence of the criminal will but deprivation of independence sometimes does not produce a deterrent effect must be followed up with other crimes. That is the reason why capital punishment is still enforced in Indonesia because of crimes that may not be worth the sentence if measured by imprisonment alone.

According to Joko Sriwidodo (2019), there are several reasons why capital punishment is abolished. First, capital punishment is considered contrary to human rights. Second, people who are sentenced to death in fact carry out two types of crimes at once namely imprisonment and capital punishment. This is because in the period of waiting for the implementation of the death penalty, the convict is languishing in prison. Third, if there is an error in the death sentence and the convicted person has been executed, then it is no longer possible to correct the mistake. There are several countries which until now have not abolished capital punishment - including Indonesia - having an argument: First, there is not a single religious teaching that forbids the imposition of capital punishment. Second, in criminal doctrine, if the crime committed has an extraordinary impact and there is no opportunity to correct the perpetrators then the death penalty can be imposed to eliminate the perpetrators. Third, capital punishment serves as a general preventive or general prevention of crime.

3.2 Death Penalty from the perspective of Human Rights

There are several articles in the UDHR that do not allow the death penalty, including as follows.

a. Article 3 "Everyone has the right to life, liberty and personal security". The most extreme form of violation of the right to life is killing or injuring one's physical or spiritually from a person or group. The death penalty clearly violates this article, where the person sentenced to death has been deprived of his life, his independence, his personal security. However, the death penalty is a punishment that violates the right to live for humans as God's creatures. Can be seen many people who have been sentenced to death, including corruptors in China, Saddam Hussein, or others. But as in the case of Rwanda and Yugoslavia, perpetrators of human rights violations were only rewarded with a maximum sentence of life imprisonment, because the death sentence in modern times has begun to be abandoned by countries in the world, although there are still some countries that still carry it out in various ways, such as hanging, shot, and injected. However, the way of the death penalty still injures oneself and takes the right of life from someone.

b. If capital punishment is reviewed according to the International Covenant on Political Civil Rights, namely Article 6 paragraph (1), every human being has the right to life. This right must be protected by law. No human being may be hastily

deprived of his life. As it is explained in Article 3 of the UDHR that the execution of death has violated Article 6 paragraph (1), executions basically cause physical pain and deprivation of the right to life of a person, and this is contrary to Article 6 paragraph (1) of the ICCPR and Article 3 of the UDHR. Although many countries have not abolished the death penalty including Indonesia, China and the Iraqi state have not abolished the death penalty, the problem is the lack of fulfilment and clear regulation of the implementation of the criminal penalties both in the process of arrest and in carrying out hearings in trials, so that matters This is contrary to the concept of the rule of law where there is a clear regulation both equality before the law and also the existence of a free and impartial trial which implies an independent judicial power.

c. Article 6 paragraph (2) of the International Covenant on Political Civil Rights states that in countries which have not abolished the death penalty, decisions can be given only for the most serious crimes, in accordance with the law in force at the time the crime was committed, and without violating a provision of this Covenant and the Convention on the Prevention and Punishment of the Extermination (tribal) Crime of the Nation. This sentence may only be carried out with the final decision of the competent court. Furthermore Article 6 paragraph (4) of the International Covenant on Political Civil Rights stipulates that a person who has been sentenced to death must have the right to request forgiveness or leniency. Amnesty, forgiveness, or relief of the death penalty can be given in all chapters. In this case, according to the description above, the author tries to argue that in implementing the death penalty it needs to pay attention to several aspects, namely, philosophical, sociological, and juridical aspects.

In addition to the regulation of basic rights, namely the right to life regulated in the DUHAM which in this case is linked to the death penalty, there are exceptions to the exercise of that right, namely by having an in-depth understanding of the existence of denotable rights, namely in the first case "a public emergency which threatens the life of nation "can be used as a basis to limit the implementation of basic freedom rights, with the condition that the state of the emergency (public emergency) must be officially announced (be officially proclaimed), is limited and should not be discriminatory. This is stipulated in a limitative manner in the International Covenant on Civil and Political Rights, in Article 4 paragraph (1) of the ICCPR, states that in a state of emergency that threatens the life of the nation and the existence of such an emergency has been officially announced, States parties to this Covenant can take efforts that deviate from their obligations under this Covenant, insofar as this is demanded by the emergency situation, provided that these efforts do not conflict with the obligations of the states' parties under international law, and do not violate.

Legal debate over the validity of capital punishment departs from the regulations above, which on the one hand still recognize capital punishment and the other side recognize the right to life. For those who reject capital punishment, the opinion that capital punishment is legally unconstitutional, because it is contrary to the constitution. In the order of the laws and regulations in Indonesia, every regulation that is below must not conflict with the one above it. The law that contains the death penalty is contrary to the constitution which recognizes the right to life. Because the constitution in the Indonesian legal system is higher than the law, the death penalty in the law must be amended. Pros and cons of the application of the Death Penalty in Indonesia broadly conical into two major sections as we have mentioned in the background above.

Parties who do not approve of the application of the death penalty, then recommend what is called conditional capital punishment be an alternative if the state still applies the death penalty. Therefore, the death penalty can be carried out under certain conditions. So the death penalty is applied as a last resort to protect the public. In addition, recommendations are also directed that the government be firm. The legal process is slow and tends to drag on to create feelings of pity and compassion among the people towards those who are sentenced to death. Although on one hand there is an assumption that the long legal process is an attempt to provide an opportunity for death row inmates, but this condition unwittingly actually has a side of legal uncertainty for death row inmates.

Although capital punishment still adheres to several national legal products, it seems to be believed if the application of the death penalty is clearly in violation of the 1945 Constitution of the Republic of Indonesia as the highest positive legal product in the country. Article 28A of the 1945 Constitution (Second Amendment) has stated that everyone has the right to live and has the right to defend his life and life. Meanwhile Article 28I paragraph (1) of the 1945 Constitution (Second Amendment) states that the right to life, the right not to be tortured, the right to freedom of thought and conscience, the right to religion, the right not to be enslaved, the right to be recognized as a person before the public, and the right not to be prosecuted based on retroactive laws is a human right that cannot be reduced under any circumstances.

From human rights studies, it may be considered that capital punishment is a crime that would deviate from human rights because it takes an individual's right to independence and takes an individual's right to have a life, but actually all of that if measured by a crime, the crime is sometimes appropriate, but also does not rule out the possibility all of these have the opposite impact on the determination of the death penalty, which means that Ham itself is the right of every individual who is inherent from within the individual from birth to stand and live independently which causes capital punishment not in accordance with human rights.

The requirements of the rule of law are that there is a separation of powers and can be controlled by the authorities of the government, and have an independent or independent judge for citizens, who should be able to resolve problems between citizens by the norms of society and decide on a criminal offense and gross human rights with humane, because judges are functionally the most important element in law enforcement in Indonesia and decide cases fairly and appropriately, while capital punishment is a decision that is not in line with the norms in Indonesia.

At the international level this type of criminal offense is prohibited to be imposed on the convicted person. The United Nations (UN) encourages the elimination of the application of this type of crime based on the Universal Declaration of Human Rights adopted on December 10, 1948, by guaranteeing the right to life and protection against torture. Likewise, the guarantee of the right to life is contained in Article 6 of the International covenants on Civil and Political Rights (ICCPR) adopted in 1966 and ratified by Law Number 12 of 2005 concerning Ratification of the ICCPR. The Indonesian criminal law system seeks to release capital punishment outside the main criminal offense, by regulating it as an alternative criminal. Capital punishment is no longer the first basic criminal offense, but instead becomes a special criminal offense.

Respect about capital punishment (capital punishment) in Indonesia as a country that has the philosophy of the Pancasila until now is a discussion that can cause problems (between the pros and cons), because there are still many among the legal experts who question this because partly because of differences and reviews. For those who reject the death penalty, capital punishment is considered contrary to Human Rights (HAM). Their struggle, for example, can be seen in the change in the status of the death penalty listed in the draft new Penal Code, which will be submitted for adoption by the House of Representatives. Article 66 of the Draft Penal Code states that capital punishment becomes a specific primary crime and is threatened by alternatives to other basic crimes (<http://dickyputraarumawan.blogspot.com/2015/02/v-behaviorurldefaultvmlo.html?m=1>).

The criminal offense is carried out by shooting the convicted person to death and not carried out in public. Imprisonment is considered to take someone's life rights. Whereas everyone has the right to live and has the right to defend his life and lives (Article 28A of the 1945 Constitution). Among those who reject the death penalty, it considers that capital punishment is not in harmony with the development of human rights. All countries have the concept of upholding human rights, and Indonesia as part of the countries in the world must participate in realizing human rights. According to them the formal legal regulation of human rights in the Republic of Indonesia should Indonesia have left the death penalty. Human rights, especially the right to life, are stated as non-denotable rights. This is stated in Article 28 I paragraph (1) and Article 28J paragraph (2) of the 1945 Constitution, Article 4 of Law Number 39 of 1999 concerning Human Rights.

We also need to know that until June 2006 only 68 countries were still implementing the practice of the death penalty, including Indonesia, and more than half the countries in the world had abolished the practice of the death penalty. There are 88 countries that have abolished the death penalty for all categories of crime, 11 countries abolished the death penalty for the category of ordinary criminal crimes, 30 countries carried out a moratorium (de facto not applying) the death penalty, and a total of 129 countries carried out abolition (abolition) of the punishment die.

But positively, the application of capital punishment in Indonesia is still widely decided by judges. As an example of the case of the murder of Sisca Yofie, the culprit was Wawan, who was convicted by the Supreme Court through his verdict on 11 November 2014 from life imprisonment to capital punishment (http://id.wikipedia.org/wiki/hukuman_mati). The consideration is the actions of the accused against the victim in a sadistic way and to provide a deterrent effect and so that the community respects the right to life of others (www.hukumonline.com). The Attorney General will carry out the executions of 5 people sentenced to death in 2014, and 20 people in 2015. President Jokowi rejected the petition for clemency submitted by 64 convicted to die in drug cases. Finally, the death penalty was carried out against the drug kingpin Fredy Budiman (Kompas, Rabu, 10 Desember 2014).

Currently there are 274 death row inmates who have not been executed. The delay in execution of 274 death row inmates may have been caused by the desire of the Indonesian government to abolish capital punishment in the main criminal code in the Criminal Code, as stated in the draft of the new Criminal Code. However, the death penalty for drug convicts is reasonable, considering that they take many other people's rights and even take many others' lives. For this reason too, President Joko Widodo answered protests over the death penalty, he said that every day 50 of our young generation die from drugs. If it is calculated a year 18,000 people (who die from drugs). See, <http://m.harnas.co/2015/04/29/eksekusi-mati-bukan-eksekusi-ham>

4. CONCLUDING NOTES

The implementation of capital punishment in Indonesia was initially carried out according to the provisions in article 11 of the Criminal Code, which was later amended by the provisions in S. 1945: 123 which entered into force on 25 August 1945 and for the provisions of its implementation in detail are explained in Law No. 2 (PNPS) 1964. Whereas in the conclusion of the Constitutional Court in the material review of Law No. 22 of 1997 concerning Narcotics to the 1945 Constitution states: "Provisions of Article 80 Paragraph (1) letter a, Paragraph (2) letter (a), Paragraph (3) letter a; Article 81 Paragraph (3) letter (a); Article 82 Paragraph (1) letter a, Paragraph 2 (letter) a and Paragraph (3) letter a in the Narcotics Law, as long as those

concerning the threat of capital punishment, do not conflict with Article 28A and Article 28I paragraph (1) of the 1945 Constitution ", meaning that capital punishment does not contradict the Indonesian Constitution.

Capital punishment according to human rights must be seen in the provisions of the Universal Declaration of Human Rights (UDHR), which in the UDHR there are several articles that do not allow the death penalty, namely; Article 3 of the UDHR, Article 6 paragraph (1), (2) and (4) ICCPR. Whereas in Article 3 of the DUHAM it is said that "every person has the right to life, independence and personal security", as well as regulated in ICCRP article 6 paragraph (1) reads "in every human being inherent the right to life, that right must be protected by law . No human being may be hastily deprived of his life ". Whereas in the constitution of the Republic of Indonesia it is stipulated in article 28A which states that "every person has the right to live and has the right to defend his life and life" and article 28I paragraph (1) which states that "the right to life, the right not to be tortured, the right to freedom of thought and conscience, religious rights, the right not to be enslaved, the right to be recognized as a person in public, and the right not to be prosecuted on a retroactive basis are human rights that cannot be reduced under any circumstances ".

In the implementation of capital punishment, there are many parties who are pros and cons, those who are pro argued that the death penalty does not violate human rights because the perpetrators have violated the human rights of victims and human rights of the community. The severity of the allegations regarding capital punishment violating human rights is considered as a one-sided statement that does not see how the human rights of victims of the crime are violated. While those who contra emphasis their view that the death penalty is considered to violate human rights because the revocation of the right to life of a person who is actually a right is highly respected and no one can revoke it. Therefore, the death penalty must be abolished in existing legislation. It is because of the pros and cons that this is likely to delay the execution of 274 death row inmates today. In the sense that the death penalty controversy lies in violating or not violating its human rights, while the death row inmates are people who have violated the human rights of others.

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HOTS Integrating STEM Learning Approach in the Nutritional Sciences Learning at The Higher Education Level

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Abstract- The empowerment of High Order Thinking Skills (HOTS) is very important in preparing graduates to participate in the globally competitive, entering the work face, and encountering the new industrial revolution 4.0 era. This study aims to (1) Determine the effectiveness of the STEM approach in empowering the HOTS of Students; (2) Determine the effect of STEM approach on the HOTS of pre-service students in the nutritional sciences learning at the higher education level. The research is quasi-experimental with nonequivalent pre-test post-test design. Analysis of covariance (ANCOVA) used to analyze pre-test and post-test data, with the pre-test data as a covariate. The results showed that the HOTS average experiment class was higher than the control class. Based on the results of a statistical test its concluded that there is a significant effect of the STEM approach in empowering HOTS in science nutrition learning at the higher education level. Consequently, the STEM approach is effective in empowering HOTS in nutrition science learning at the higher education level.

Index Terms- HOTS, STEM, Nutritional Science, Education

I. INTRODUCTION

In order to face the new industrial revolution 4.0 era, universities have to improve their quality and learning quality. The improvement can be supported through interactive, scientific, contextual, thematic, effective, and collaborative learning. Furthermore, in the industrial revolution, the graduates have to be able to encounter the globally competitive, entering the work face and encountering the new industrial revolution 4.0 era. Therefore to support those abilities, there are various learning approaches that can be used, such as the Sciences, Technology, Engineering, and Mathematics (STEM) learning approach. STEM can accommodate the various fields of science, such as science, technology, engineering, and mathematics into a unified holistic [1], [2]. STEM education plays a vital role in establishing the culture and economic growth through innovation [3]. Furthermore, these four disciplines can become a basis for the development of science and technology so that the students will have competencies to entering the globalization era that changed rapidly. STEM has many potential benefits for individuals and the nation as a whole [4]. The benefits were the students can have the science and technology literacy that can be seen from reading, writing, observing, and scientific skills. It is certainly in accordance with the era of the revolution of industry 4.0 that requires the mastery of literacy and information technology.

The definition of the STEM in science about the natural world including the laws of nature that associated with physics, chemistry, and biology [5]. Technologies include in the fields, which involves the application of knowledge, skills, and the ability of human beings to produce something that can facilitate life activities [6]. Engineering is the process of designing to make a product or work steps [6]. Mathematics is a science related to numbers, operations, relationships, and shape [7]. Furthermore, there are eight-step and characteristics in STEM education, such as (1) asking questions (for science); (2) developing and using models; (3) planning and carrying out investigations; (4) analyze and interpret data; (5) using mathematics and thinking computing; (6) constructing explanations (for science); (7) arguments the proof; (8) obtaining, evaluating, and communicating the information [8].

A variety of learning approaches conducted in learning activity so that the understanding of the theory and lecture material can be well understood by the students. To determine the success of learning activity can be seen from the various indicators, knowledge mastery, attitudes, and skills. Moreover, the thinking process in the Bloom's taxonomy entered in levels of cognitive. Where the level of cognitive includes six (6) levels, such as; knowledge, comprehension, application, analysis, evaluation, and creation. It is based on

levels of thinking skills, starting from the lowest level to the highest. The ability to think on a HOTS in the Bloom's taxonomy includes the process of analyzing (C4), evaluating (C5), and creating (C6) [9],[10].

The empowerment of the High Thinking Order Skills (HOTS) is one of the indicators in measuring student success in concept mastery. HOTS is very important for the students to help analyze the problems. Where in solving problems, students were required to think creatively. Students who have high ability levels will be easier to solve the problem [11]. While the definition of HOTS according to is an person's ability to control their plan, evaluate and monitor progress, be flexible, adaptable, and can solve problems in various contexts [12].

High level of thinking skills was divided into four groups; problem-solving, decision making, creative thinking, and critical thinking [13]. A high level of thinking that involves various types of exploration of questions related to issues that are not clearly defined and do not have a definite answer. Therefore, the necessary exercise of drawing up explanations, exercises make a hypothesis, generalizing, and documenting those findings with evidence. Based on some opinion, then HOTS can be defined as a skill of high-level thinking that requires thinking critically, creatively, analytically, to information in solving a problem.

Nutrition science learning is one of the compulsory subjects in the curriculum of higher education in the biology education department of IKIP Budi Utomo Malang. The learning activities of nutrition science particularly have not been able to accommodate the output-oriented in the 21st century, especially the HOTS. That because of the Less synergy between the lecturer, learning methods and learning models, technology, and human resources, so that the output not at the maximum level. The observation results showed that 60% of the students still have a low level of HOTS, especially on the nutrition science subjects. This is due to the learning process that occurs in IKIP Budi Utomo that is starting to lead to a paradigm of student-centered learning, but not all of the lecturers enrich the skills of HOTS. Moreover, the STEM used to make nutrition science learning became meaningful and deep learning. Referring to the gap analysis, the problem in this research is how the effectiveness of STEM in empowering HOTS of nutrition science learning at IKIP Budi Utomo Malang?

II. LITERATURE REVIEW

A. STEM (Sciences, Technology, Engineering, and Mathematics)

STEM is a learning approach that integrates the four areas of science, technology, engineering, and mathematics into one unified holistic [1]. STEM as the following: (1) the science of representing the knowledge about the law and the prevailing concept of nature; (2) technology as a skill, or a system used in regulating the society, organization, knowledge or the design and use of tools created to facilitate the work; (3) Engineering as the knowledge to operate or design a procedure to solve the problem; (4) Mathematics as a science that connects to the scale, numbers and space which only requires logical arguments without or accompanied by empirical evidence [14]. Thus, the purpose of the STEM approach is that the learners have science and technology literacy that can be seen from reading, writing, observing, and scientific skills, and then able to develop that applied skills in facing daily life problems [1]. Some empirical research proved that STEM learning has the potential to generate a competitive upcoming labor force with 21st-century skills [2], [15].

B. High Thinking Order Skill (HOTS)

The high order thinking skills (HOTS) ability was the ability to understand, analyze, synthesize, evaluate and create a concept so that the concept can be understood and attached to the student's long time memory [16]. HOTS has some indicator to include: (1) analyzing (analyzing), where the learners should be able to decipher or detailing a problem in the form of a question into a section more specific and able to connect the part; (2) evaluating, learners able to make consideration of a condition, method, or idea; (3) Creating (creating), learners should be able to synthesize knowledge or information into new knowledge [17]. HOTS has another name, namely the metacognitive ability, which means the individual knows the time to take control of his plan, evaluate and monitor the progress, to be flexible, adaptable, and can cope with problems in various contexts [12]. Thus, HOTS was an ability to take control of the plan, evaluate and monitor the progress, flexible, adaptable, and can cope with problems in various contexts. HOTS can be achieved through many activities that not just memorize the material.

III. METHODS

A. The Research Design

Quasi-experimental research was applied through the pre-post nonequivalent design, where the control and experiment class from the 2016 biology education department at one of the higher education levels in East Java, IKIP Budi Utomo Malang. The HOTS data obtained from the pre-test and post-test scores of the control and experimental class. The research design is contained in Table 1.

Table 1. Research Design of Quasi-experimental with Pre-Test and Post-Test Nonequivalent

Class	Pre-test	Treatment	Post-test
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Kontrol	Y1	X1	Y3
Eksperimen	Y2	X2	Y4

B. Research Sample

Using One-Stage Cluster sampling with divide the population into groups or clusters, then some clusters were selected randomly as the representative of the population, then all elements in the cluster were selected as the research sample. The population in this research was the students of the 2016 biology education department, which divided into 2 (two) classes. The number of the overall sample were 46 students divided into two classes, 25 students in the experiment class and 21 students in the control class.

C. Instrument

The instrument was an essay questions test to measure the six indicators of HOTS aspects. The essay questions test has intervals 1-4 in accordance with the criteria, respectively. The validity of the instrument using the validity of the content, meaning that the instrument HOTS has been assessed for feasibility by the expert.

D. The Data Analysis Technique

Data were analyzed using SPSS 16.0 for Windows to determine the results of a descriptive analysis of the pretest-posttest. The test of normality using the one-sample Kolmogorov-Smirnov test, while homogeneity using the test of Levene. Then to find out the effect of the STEM towards the empowerment of HOTS using a General Linear Model (GLM)–Multivariate test ANCOVA.

IV. RESULTS AND DISCUSSION

The results of the descriptive analysis of the HOTS showed in Table 2 below.

Table 2. Descriptive Analysis

Descriptive Statistics			
Dependent Variable (Post-test)			
Group	Mean	Std. Deviation	N
Control	78.4800	8.45143	25
Experiment	82.7619	6.49542	21
Total	80.4348	7.84192	46

Based on Table 2, showed there was a difference in the average score between the control and experiment class. The average score of the control class was 78,48 lower than the average score of the experiment class in the number of 82,43. That showed that the average score of the experiment class higher compared to the control class.

A. The results of the Homogeneity Test of HOTS

A homogeneity test was conducted to the HOTS post-test data. The results of the homogeneity e test showed in Table 3. Based on the calculation of obtained significance. P-level that was greater than 0.05, meaning both data were not different or homogeneous.

Table 3. The Homogeneity Test Result of HOTS

Levene's Test of Equality of Error Variances ^a			
Dependent Variable (Post-test)			
F	df1	df2	Sig.
1.460	1	44	.233

Tests the null hypothesis that the error variance of the dependent variable is equal across groups
 a. Design: Intercept + pre-test + model

B. The results of the Analysis Test ANCOVA on the Empowerment of HOTS

Analysis of covariance (ANCOVA) was conducted to determine whether there were differences in post-test in the experimental and the control class. The test results of the ANCOVA can be seen in Table 4 below.

Table 4. The ANCOVA Test Result

Tests of Between-Subjects Effects					
Dependent Variable (Post-test)					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2330.950 ^a	2	1165.475	114.850	.000
Intercept	126.415	1	126.415	12.457	.001
Pre-test	2121.695	1	2121.695	209.080	.000
Model	308.422	1	308.422	30.393	.000
Error	436.354	43	10.148		
Total	300376.000	46			
Corrected Total	2767.304	45			

a. R Squared = .842 (Adjusted R Squared = .835)

The analysis of covariance (ANCOVA) results showed that F count was 114,850, with a significance value of $0.000 < 0.05$. The significance value was less than 0.05 ($p < 0.05$), so the null hypothesis was rejected, and the research hypothesis was accepted. That means that STEM affected the empowerment of students HOTS. Moreover, to determine the differences in the average correction of each class by using a further test technique of LSD. The summary of the LSD test can be seen in Table 5 below.

Table 5. LSD test Result

Group	Mean	Notation
Experiment class	82.7619	a
Control class	78.4800	b

Table 5 showed the difference in HOTS average in each class. The lowest average value was from class control in number 78.4800, while the experiment class average was 82.7619. It showed that the corrected average value was significant, meaning the treatment showed a significant difference with the control class.

C. Discussion

Based on the descriptive analysis, there was a difference in the post-test average value between the control and experiment classes. The HOTS average in the experiment class that implementing the STEM approach higher than the control class. This was due to the implementation of the STEM that causes the learning to become more meaningful in studying concept [18],[19]. Furthermore, it also supported by the character of STEM, such as the emphasis on science, where students required to ask a question then proceed with the planning and carrying out investigations in material science of nutrition. Moreover, to answer the problem, students analyze and interpret the data systematically from the results of the investigation conducted. Through the process of science, students were able to develop knowledge, especially their HOTS. Inline, the development of student's skills was very important. The student's capabilities could be measured through how the students understand to learn correctly, creatively and could increasing their own skills [20]. Furthermore, the students could use science to answer the problem through scientific methods, raise and answer the hypothesis through an investigation by connecting the surrounding nature or the real world. Such activities could make students became a more creative person. On the other hand, the scientific method could make students became more creative people not only in learning activities but also in their daily lives [18].

The research findings showed there was a significant effect of the STEM implementation to empower students HOTS in nutrition science subjects. Through STEM implementation, students were able to interpret, analyze information, simplify, and solve problems so that the HOTS could increase. In addition, STEM provided an opportunity for teachers to demonstrate how concepts, principles, and techniques of the science, technology, engineering, and mathematics can be used in an integrated way in the development of products, processes, and systems used in everyday life. The increasing of HOTS indicators can be seen from the good mastery concept when students able to think high-level, where not only remember and understand the concept, but can analyze as well as synthesize, evaluate, and create a concept properly. Furthermore, the concept gained can be attached to the student's long time memory [16],[21]. The previous research showed that STEM implementation could improve the students learning outcomes, creative thinking, and

critical thinking skills [5]. Some factors that cause students to have different HOTS ability were the level of intelligence and the ways every student face difficulty [17].

Based on the test Least Significance Different (LSD) there were differences in the average correction between the experiment and control class. That is because through STEM make students can have innovation, thinking logically and independently, have technological literacy, able to connect the culture and history with education, and able to apply their knowledge in real daily life [5]. The advantage of integrating STEM in the learning activities as it can emphasize the students to became active in the learning activities using technology products. The reason because that can encourage students to learn more actively and meaningfully so that student's critical thinking skills become higher when the students being more aware of the concept at the maximum level. The integration of the STEM approach in problem-based learning could improve student's critical thinking skills in chemistry [22].

Furthermore, there were seven reasons to involve students in the STEM approach. STEM will empower student's understanding of important science and mathematics concepts [23],[24]. Thus, students become innovative critical thinkers and can make good decisions wisely. It is because students understand how to approach and solve problems using STEM skills. It also develops a sense of ethics and social conscience among students. STEM helps the students to develop good collaboration skills and become more technologically literate. Lastly, STEM promotes students to understand how their STEM coursework will enhance their future careers [25].

Moreover, 21st-century teaching and learning using the STEM approach is one of the keys to effective, meaningful learning and in-depth understanding that can link science, technology, engineering, and mathematics among students. Thus, with the help of technological advancement, the STEM education approach should include elements of problem-solving, critical thinking, creative thinking and scientific thinking that can enhance the HOTS among students [19].

V. CONCLUSION

The conclusion was STEM implementation can empower students HOTS at the higher education levels. It is showed from the differences of the average correction of the experiment and control class in the value of the corrected average difference. The average experiment class score higher compared to the control class. Based on the statistical test results, there is a significant effect of STEM in empowering the HOTS of students in the science of nutrition at the higher education levels.

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A case of Denosumab induced severe hypocalcemia causing Seizure in a patient with advanced chronic kidney disease

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Abstract- Background:

Denosumab, a RANKL inhibitor, inhibiting osteoclast formation, can cause severe symptomatic hypocalcemia especially in cases with renal impairment stage 4 and 5 (1). MHRA safety alert warns that the patients with severe renal impairment with Creatinine clearance of ≤ 30 ml/min or those who are receiving dialysis, are at the highest risk of hypocalcemia (1). In individuals with CKD stages 4-5, anti-resorptive bone protection therapy might cause harm with increase the risk of fracture and vascular calcifications in low bone turnover conditions by further inhibiting osteoclasts while high bone turnover diseases are more susceptible to hypocalcemia (3). The incidence of hypocalcemia in CKD is reported to be 14-15% (4).

Index Terms- Denosumab, CKD, hypocalcemia

Abbreviation: RANKL receptor activator of nuclear factor kappa B ligand; CKD chronic kidney disease; MBD mineral and bone disease; CT computerized tomography; eGFR estimated glomerular filtration rate; P1NP N- terminal propeptide of type 1 collagen; FGF fibroblast growth factor

I. CASE PRESENTATION

A 70 years old lady was admitted to the emergency department after the first episode of generalized tonic-clonic seizures for 10 minutes during her sleep. Her general and neurological examination were normal. Her blood glucose level was normal.

Her past medical history included chronic kidney disease stage IV, recent left fractured neck of femur requiring hemiarthroplasty, osteoporosis, hysterectomy, asthma, hypertension, chronic back pain and spondylosis.

On admission, her blood tests with Full Blood Count and renal function were at the baseline. Her Calcium level on venous blood gas was 0.62 mmol/l. She had significantly low adjusted serum calcium level of 1.43 mmol/L and a serum magnesium level of 0.5 mmol/l. Her CXR and CT head were reported normal. Her ECG showed prolonged corrected QT of 526ms. Her provoked seizure was secondary to severe hypocalcemia.

Endocrinology advice was sought and she received 2x10ml of 10% IV calcium gluconate injection followed by infusion with the target adjusted serum calcium of 1.8mmol/L and above. After the first dose, her corrected QT was improved to 490ms and

adjusted calcium level improved to 1.52 mmol/l. Her low magnesium was corrected by IV magnesium. Subsequently, her hospital stay was complicated with the development of AKI on CKD and pneumonia during requiring intravenous fluid and antibiotics. She gradually recovered from her illness and was discharged after 18 days.

On reviewing her medical notes, we found, 12 days before admission, she had received the first dose of Denosumab injection 60mg SC, for bone protection in the osteoporosis clinic. On the day of the injection, her routine blood test showed vitamin D 25(OH) level of 59.1 mmol/l, adjusted calcium 2.42 mmol/L and eGFR 11 ml/min/1.72m² (CKD stage 5). Her GP was advised to commence her on ADCAL D3 1-tab BD following Denosumab injection, however, she did not receive this due to delay in the communication.

A clear discussion was made with the patient regarding the cause of the seizure with an apology and following a detail discussion, she decided not for any further Denosumab injection.

II. DISCUSSION & CONCLUSION

In people with chronic kidney disease, especially stage 4 and 5, osteocytes increased FGF23 which suppressed parathyroid hormone secretion and reduced 1 α hydroxylase production, affecting less absorption of calcium from the gut in addition to phosphate retention, leading to reduced free calcium. All these mechanisms cause hypocalcemia in CKD (4).

Denosumab inhibits osteoclastic activity, reducing calcium resorption from the bone which ends up in hypocalcemia.

The FREEDOM trial including 7808 postmenopausal women with vertebral, non-vertebral and femur fracture with osteoporosis reported that Denosumab significantly lowers the risk of fracture after 36 months. It increased BMD by 9.2% (95% CI: 8.2, 10.1) at the lumbar spine and 6.0% (95% CI: 5.2, 6.7) at the total hip compared with placebo. However, the trial excluded severe CKD patients and on dialysis. (5)

Usually, Denosumab was not excreted by kidneys, thus could be used in patients with renal failure with no need for dose adjustment. It is relatively well tolerated.

Subset analysis of FREEDOM trial showed Denosumab 60mg every 6 months was not associated with increase adverse events among patients with severe renal failure (n=73, Cr Cl 15-29 ml/min) or impaired renal function (n=2817 Cr Cl 30-59

ml/min) compared to those with normal renal function (n= 4911 Cr Cl>60 ml/min). Thus, Denosumab does not require monitoring renal function or dose adjustment before administration (2).

Serum adjusted calcium must be >2.2 mmol/L and vitamin D levels adequate (50-100 nmol/L) before each injection. Patients must be adequately supplemented with Calcium (at least 700 mg daily) and vitamin D (at least 800 units daily) (1).

Although hypocalcemia most commonly occurs within the first 6 months of treatment, it may occur at any time following Denosumab injection. It is reported to happen in the first 2 weeks of the first dose (1). The overall incidence of hypocalcemia with Denosumab is between 5.5-15% as compared to Zoledronate 3.4-6%. Incidence of severe hypocalcemia is also higher in patients treated with Denosumab as compared to Zoledronic acid (3.1% vs 1.3%) (6).

Risk of developing hypocalcemia depends on renal failure (Cr Cl <30) or patients on dialysis, advanced metastatic cancer prostate or non-small cell cancer, Vitamin D deficiency, Lack of calcium or calcitriol supplement, concomitant treatment with loop diuretics and history of parathyroidectomy (3).

III. TAKE-HOME MESSAGE

We wanted to highlight this case to increase the awareness of severe hypocalcaemia in Denosumab treatment causing potentially life-threatening complications even after a single dose. We also emphasized the patient education of such complication and clear communication with GP regarding post-injection advice on calcium supplement and monitoring calcium level to avoid such preventable condition. Also, we emphasized careful

consideration and risk assessment of Denosumab in patients with severe renal impairment.

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Industrial Units and Workforce Participation in the Kashmir Valley

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Abstract- Kashmir valley is known for its scenic beauty and mesmerizing landscapes in the Jammu and Kashmir state. It has great potential for industrial development. Micro, small and medium enterprises (MSMEs) have played a significant role in the development of an economy. This study is about the industrial units and workforce participation in the Kashmir valley. There has been attempted to assess small scale industrial (SSI) units, handicraft centers, handloom centers, sick industries, female workforce, main worker and non-workers etc. at a district level in this valley. Industries like handicraft, handloom and cooperative societies have an enormous importance because of its high-level employment opportunities and low capital cost. There are taken certain indicators pertaining to this study to identify the industrial and workforce conditions in the Kashmir valley. This place has suffered due to poor infrastructure, militancy, lack of investment and marketing, poor governance and political instability.

Index Terms- Small Scale Industrial (SSI) Units, Handicrafts, Handlooms, Cooperative societies, Sick Industries, Districts, Kashmir valley.

I. INTRODUCTION

Industries play a significant role in the development of an economy. Firm and industry are essential to the evolution of any economy and they are more crucial to a developing economy rather than a developed one (Das, 1995). Kashmir valley is known for its arts, crafts, scenic beauty and bracing climate. Its crafts range from woolen textiles, hand-woven carpets, papier-mache, wood work and silverware etc. These are products of unique craftsmanship. Moreover, people earn good foreign exchange worth crores of rupees annually from these products (Planning Commission, 2003). It has remained an industrially backward state due to lack of investment, non-inclusion of private players, poor connectivity, lack of infrastructure, shallow markets and law and order situation (Majeed, 2018).

The state of Jammu and Kashmir have a rich heritage of handloom and handicrafts. These two small units occupy a significant position both in the national and international markets. These units have major contribution in the revenue

and employment generation. Although, these units have not been performed well due to lack of a branding, poor quality and obsolete designs and so on (Din, An economic analysis of Jammu and Kashmir handicraft exports and its marketing, 2015). The handicraft sector has suffered because of its low capital, lack of skilled education, poor exposure to new technologies, absence of marketing and institutional framework (Yasmin & Bhat, 2013). Although, this sector provides employment to artisans and craftsmen. It is labor intensive and eco-friendly activity which requires less investment compared to other sectors of the economy. Similarly, employment investment ratio of this sector is much higher than other sectors. This is an important source of income generation for seasonal agricultural labor force (Din & Bhushan, 2014).

Industrialization is necessary to the economic development of any country. It creates lot of avenues for absorbing the excess manpower and make sure the availability of mass consumption of goods. The process of industrialization also harnesses the raw resources into useful consumer products and become a means and tools of production in the development of infrastructure (Dar & Ahmad, 2013). Micro, small and medium enterprises (MSMEs) performs a crucial role in the development of the economy with efficiency, flexibility and innovative entrepreneurial spirit. The MSME sector contributes significantly to the country's manufacturing output, employment and exports (Ahmed & Verma, 2018). Moreover, the border of Jammu and Kashmir state has been one of the most economically backward states due to various socio-economic, political and geographical factors (Gani, 1990). This state has not been able to attract investment in secondary sector and remained industrial backward state. The political instability and lack of infrastructure are key reasons of industrial backwardness (Hamid, 2017). Industrial agencies such as state industrial development corporation limited (SIDCO), small scale industries development corporation limited (SICOP), small industries service institute (SISI) and directorate of industries and commerce (DIC) are the main agencies responsible for the development of industrialization in the Kashmir valley and in the state.

The state of Jammu and Kashmir have a primary producing economy and most of the working population is engaged in agriculture. Workforce participation rates differ with the stages

of economic development with respect to cultures, age groups and sexes. The demographic structure of workforce is determined by the sexes, distribution and composition of the population. Indian is predominantly an agricultural economy which contributes about one third to the total economy. It provides employments to more than half of the workforce (R.B.Bhagat, K.C.Das, Sebastian, & Mohanty, 2008). A changing of occupational structure not only bring changes in the economic relations of employment and workforce, but it also brings significant transformations in social structure and social relations. As occupation is considered as the most important indicator of a person's social status and life style (Kuo & Chen, 1987). Tourism and agriculture are the two sectors which have considerable contribution in the valley's economy. But in recent decades, service sector is growing in the Kashmir valley. Infrastructure development which is considered as the key to long-term sustainable growth of the economy has heavy dependence on bank financing. The sectoral contribution of GSDP for Jammu and Kashmir state in 2013-2014, has been 21.07 percentage in primary, 22.39 percentage in secondary and 56.44 percentage in tertiary sectors respectively. The tertiary sector is emerging as the major contributor to gross state domestic product (GSDP) and gross domestic product (GDP). The gross district domestic product (GDDP) share in Kashmir valley is high in the combined districts of Srinagar and Ganderbal (28.12%), Baramulla and Bandipora (21.93%) and Anantnag and Kulgam (18.85%). Kupwara is the only district which has 9.57 percentage share of GDDP in the Kashmir valley (Digest of Statistics, 2013-14). The regional position indicates that 48.07 percentage share of Kashmir region, 48.69 percentage share of Jammu region and 3.24 percentage share of Ladakh region in

GSDP of the year 2009-10 (Indicators of Regional Development, 2011-12).

Study Area

The Kashmir valley has an area of 15,984 square kilometers. The total population is 6.908 million, whereas the state has 12.55 million population (Census of India, 2011). Jhelum and its tributaries are famous rivers of this region. The valley has ten districts which includes Budgam, Bandipore, Anantnag, Baramulla, Ganderbal, Kulgam, Pulwama, Kupwara, Shopian and Srinagar. It comes under seismic zone five and is vulnerable to natural disasters like earthquakes, floods, avalanches and landslides. The valley has geopolitical importance as it is closed to the international border of Afghanistan, Pakistan, and China. It is located between the coordinates of 73° 55' E and 75° 35' E, and 35° 25' N and 34° 45' N in India.

Objectives

To study and assess the viability of industrial units and workforce participation in the Kashmir valley.

II. DATABASE AND METHODOLOGY

The purpose of this study is to analyse the industrial units and workforce participation in the Kashmir valley. Literature review is done pertaining to this study with the help of journals, articles and other sources. The data is collected from secondary sources. There are several indicators which have been chosen from census of India and digest of economy, directorate of economic and statistical department, Jammu & Kashmir. The ArcMap is used as a tool for analysing and preparing maps in this study. The chosen indicators are given below:

Sr. No.	District Name	No. of registered small scale industrial (SSI) units	No. of registered SSI units per 100 sq.km	Employment generation in SSI units	Occupied census houses used as factory, workshop etc- 2011 (in %)	Handicraft centers	Handicraft trainees trained	Handloom centers	Handloom trainees trained
1	Kupwara	1866	78	6744	0.72	27	322	10	98
2	Badgam	4206	307	29076	0.89	91	1422	6	69
3	Baramulla	4272	127	18015	1	48	908	7	83
4	Bandipora	161	47	786	0.95	12	216	1	10
5	Srinagar	10163	7208	49961	1.48	68	834	7	90
6	Ganderbal	175	17	1128	0.8	39	645	4	39
7	Pulwama	2897	267	14344	1.02	23	231	4	45
8	Shupiyar	138	23	715	0.69	6	52	1	10

9	Anantnag	4452	153	19871	1.01	28	491	6	75
10	Kulgam	184	45	1159	0.72	19	290	1	10
No. of cooperative societies	Memberships (unit number)	No. of units identified sick	Main workers (in %)	Main HH industrial workers (in %)	Main cultivators' workers (in %)	Main agricultural workers (in %)	Main others workers (in %)	Female workforce participation rate	Non-workers population (in %)
173	3022	16	54.06	2.08	11.78	7.94	78.21	16.66	73.68
323	2349	33	61.44	10.91	25.89	8.76	54.44	24.34	71.49
211	1927	32	61.79	4.07	16.55	10.19	69.18	17.95	69.82
106	1041	16	50.34	12.67	14.34	12.54	60.46	32.1	61.93
1039	2349	141	81.18	3.8	2	1.97	92.23	18.18	67.08
182	1276	24	52.48	3.65	9.87	10.46	76.02	27.34	66.08
217	1833	31	52.17	3.77	19.14	7.11	69.97	26.53	66.38
35	381	13	62.36	2.78	53.35	6.88	37	27.12	67.05
260	2365	65	45.37	3.03	20.74	11.12	65.11	37.38	63.87
70	582	10	48.64	3.36	34.4	11.35	50.89	36.05	62.31

Table

1:

Indicators of Industrial Units and Workforce Participation (2011, 2011-12)

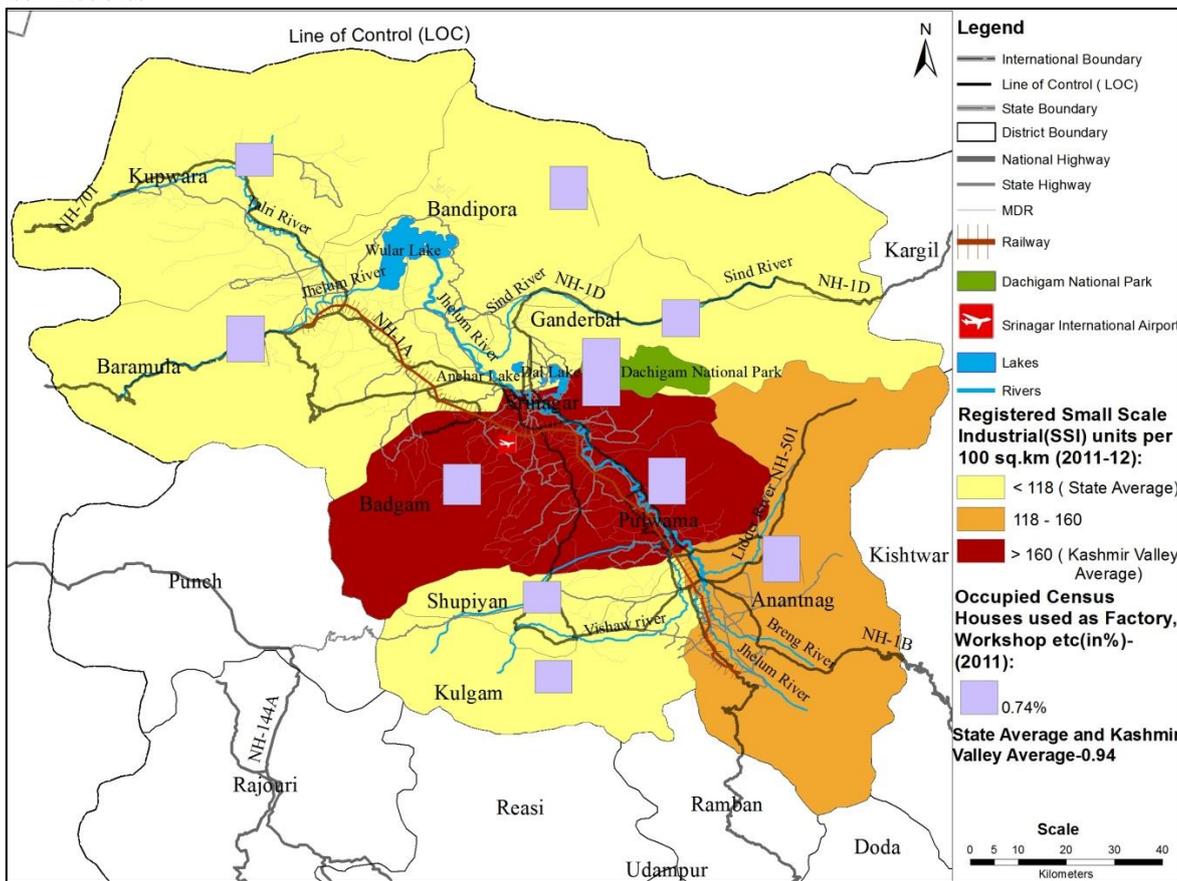
Source: Census of India, 2011 and Directorate of Economic and Statistical Department, (DESD), J & K, 2011-12

III. FINDINGS AND DISCUSSION

Industrial units have immense potential to bring economic growth and equitable development. Kashmir valley has also great suitability and possibilities for industrial and social

development in the state of Jammu and Kashmir. There has been discussed about the industrial units and workforce participation in the following paragraphs with their findings.

Map 1: Registered Small Scale Industrial (SSI) units per 100 sq.km (2011-12) and Percentage Share of Occupied Census Houses used as Factory, Workshop etc. (2011)



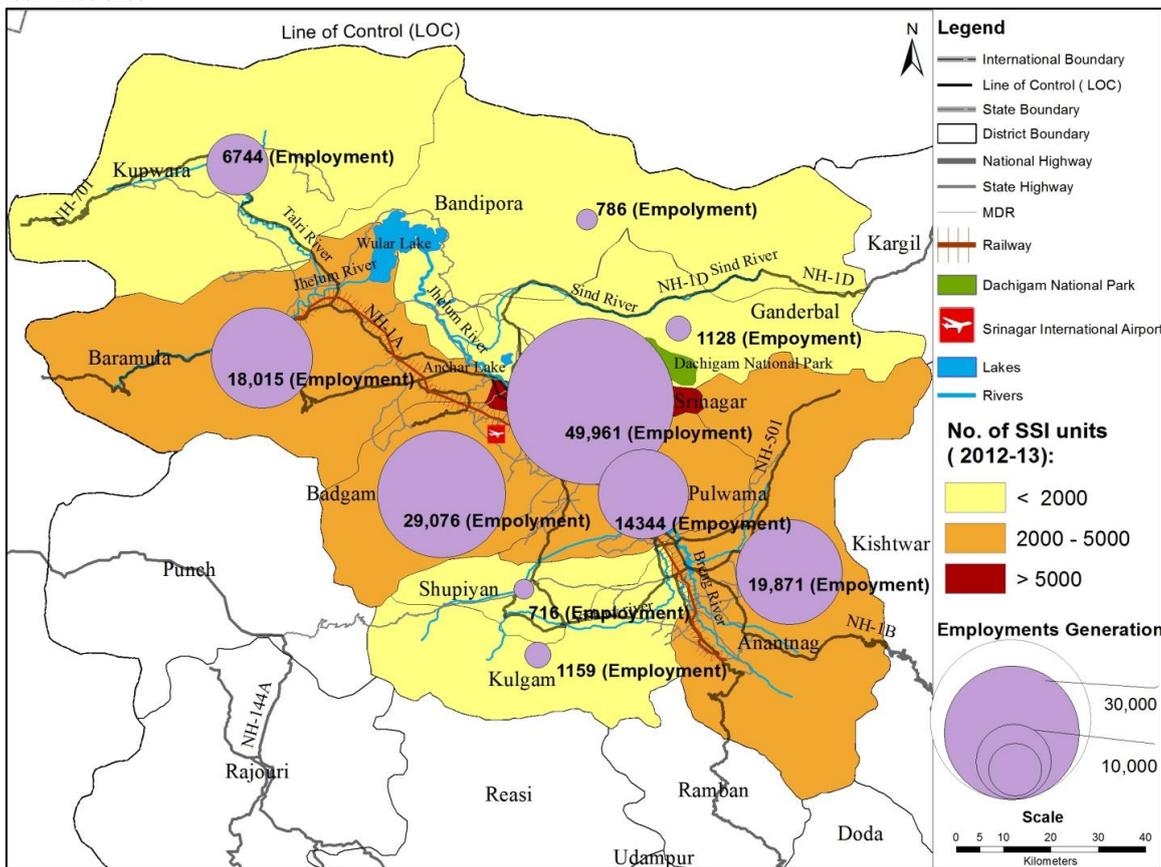
Source: Directorate of Economic and Statistical Department, (DESD), J & K, 2011-12

There were registered 54714 small scale industrial (SSI) units with the state industries department which provided employment to 260393 persons. Registered SSI units per 100 sq. km are lower than the state (118) and Kashmir valley average (160) in the districts Kupwara, Bandipora, Kulgam, Baramulla and so on. On the other hand, the registered SSI units per 100 sq. km are higher than the Kashmir valley average in Srinagar, Badgam and Pulwama districts.

Percentage share of occupied census houses used as factory, workshops etc. are higher than the state average and

Kashmir valley average (0.74%) in Srinagar, Baramulla, Bandipora, and Pulwama and Anantnag districts. While Kupwara, Ganderbal, Kulgam and Shupiyan have lowest percentage share of occupied census houses used as factory, workshops etc. and are lower than the state average and Kashmir valley average. Srinagar district have a greater number of industrial units and occupied census houses used as factory, workshops etc., because it is the capital city of Kashmir valley.

Map 2: No. of SSI Units and Employment Generation (2011-12)

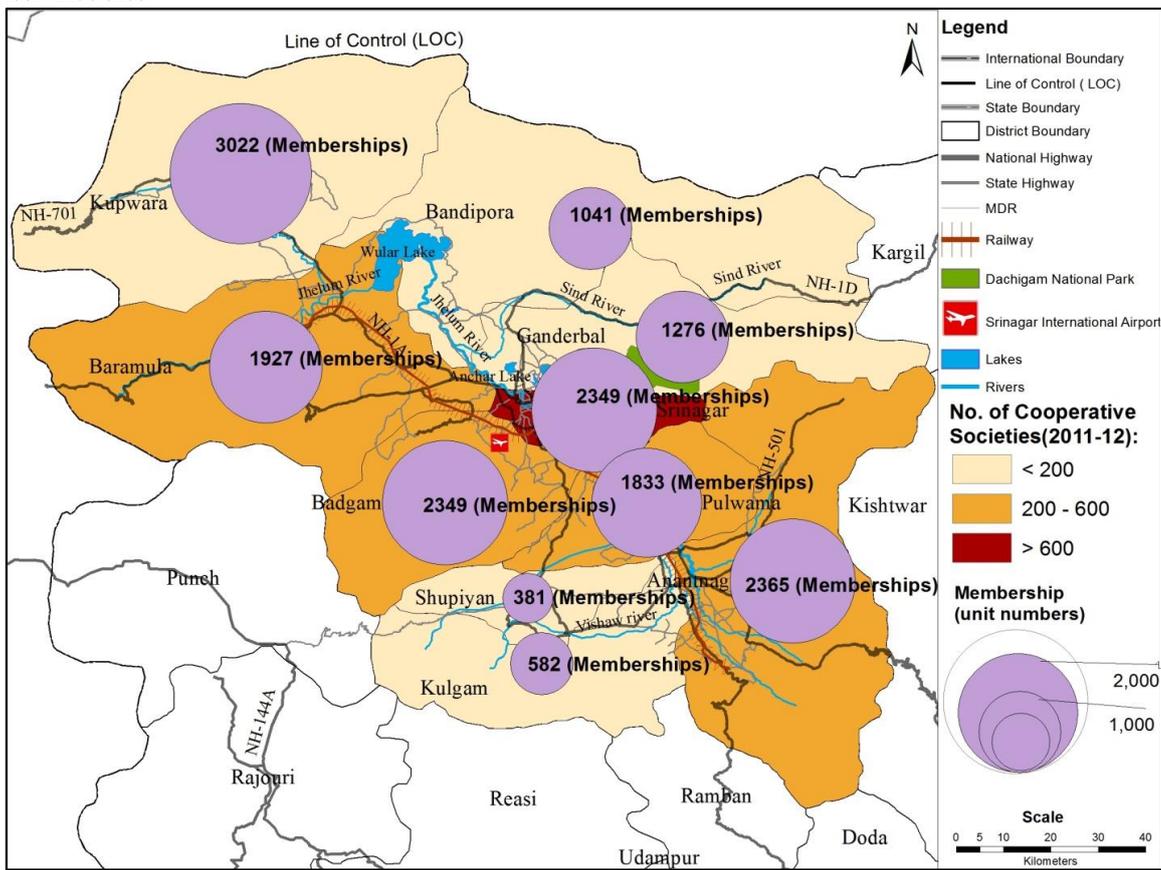


Source: Directorate of Economic and Statistical Department, (DES), J & K, 2011-12

Srinagar is the only district where the number of SSI units is more than 5000 and give employment for 49,961 people. There is a direct correlation between SSI units and employment generations as an employment generation is high in those districts where the number of SSI units has been high. The fringe districts like Kulgam, Shupiyan, Ganderbal, Bandipora and Kupwara are being generated lower employment opportunities as they have fewer SSI

units. The main objectives of the industries are to promote cottage and small-scale industries, industrial cooperatives, industrial estates and to arrange credit to the artisans in the Kashmir valley. Industrial estates should be developed keeping in mind economic considerations like raw material availability, human resources, geographical location, proximity to the market etc.

Map 3: No. of Cooperative Societies and its Membership (2011-12)

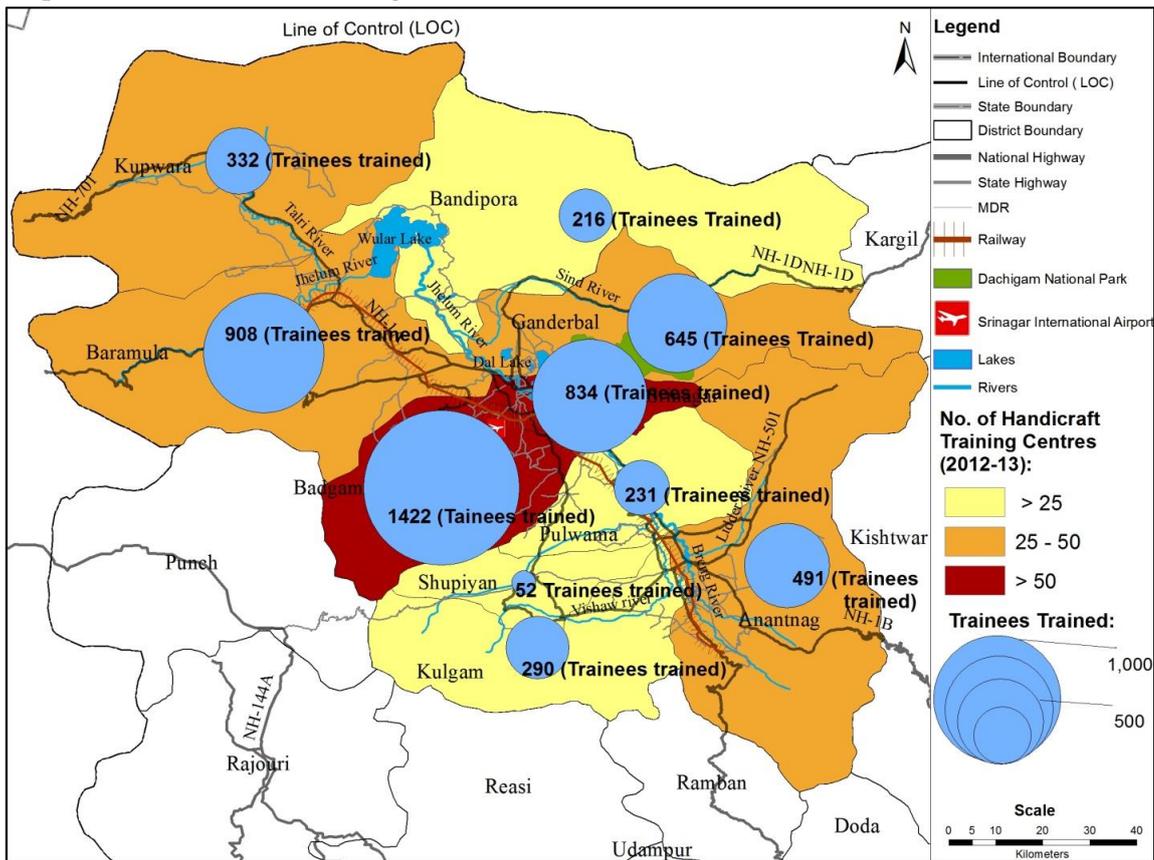


Source: Directorate of Economic and Statistical Department, (DES), J & K, 2011-12

There are different kinds of cooperative societies in the Kashmir valley like agriculture, dairy, poultry, housing, floriculture, medical, educational, consumer business, banking, women empowerment, transport, vegetable growers etc. In terms of cooperative societies, Srinagar is the only district where number of cooperative societies is more than 600. There are a smaller number of cooperative

societies in the districts of Kulgam, Shupiyan, Ganderbal, Bandipora and Kupwara and the number of memberships is also lower in these districts. Similarly, membership in cooperative societies is also high in the Srinagar district. Kupwara is the only one district which has a high number of memberships in spite of fewer cooperative societies.

Map 4: No. of Handicraft Training Centres and Trainees Trained (2011-12)

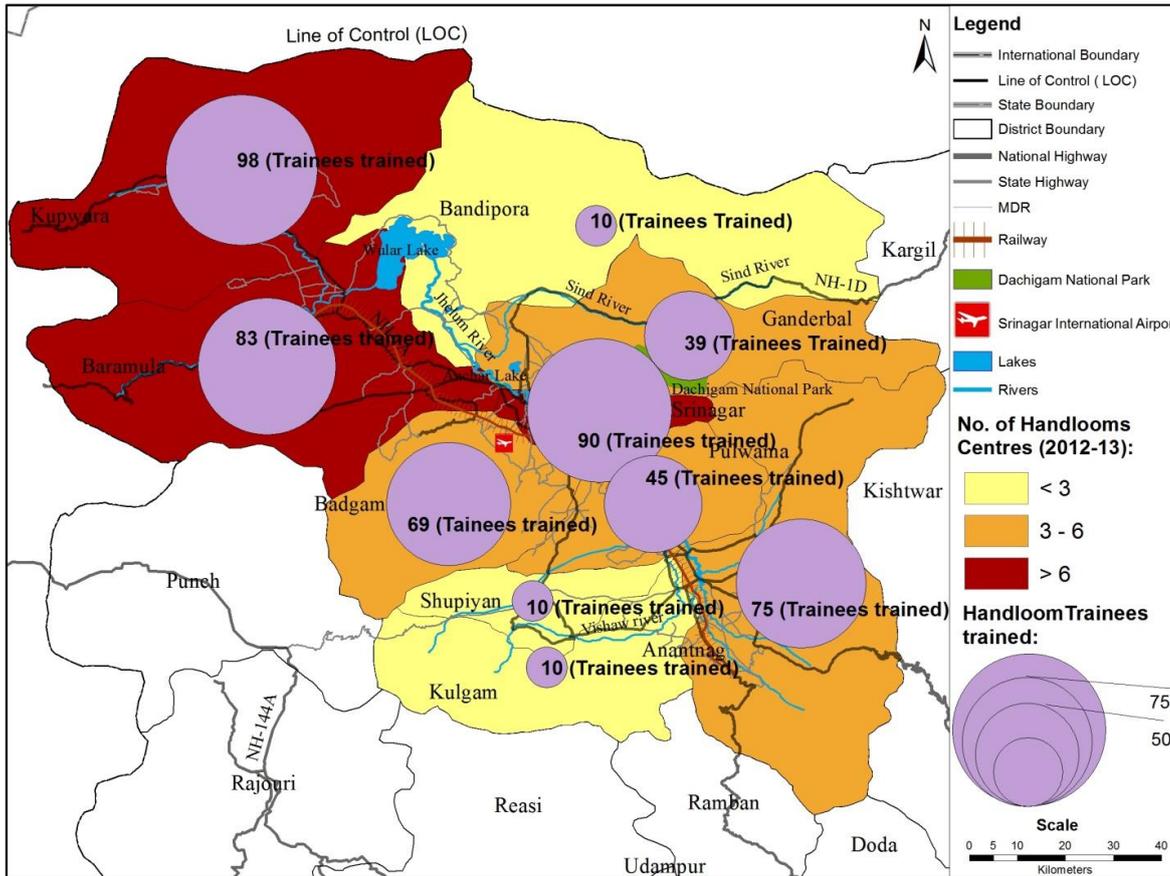


Source: Directorate of Economic and Statistical Department, (DESD), J & K, 2011-12

The handicraft of Kashmir valley is known both in national and international markets. It is the key economic activity of the people in the state of Kashmir valley. It has one of the richest traditions of craft culture and has great contribution in the state economy. There are nearly 2.50 lakh artisans directly dependent upon handicrafts in the state for their livelihood. Currently, this sector earns around Rs.1700 crores as foreign exchange every year. The number of handicraft training centres are notably high in Badgam and

Srinagar whereas there have been fewer number of training centres in Kulgam, Shupiyan and Bandipora districts. There are 908 trainees trained in Baramulla, 834 in Srinagar and 1422 in Badgam. Badgam have the highest number of trainees trained in the whole Kashmir valley. On the other hand, Shupiyan is the only one district where few (52 trainees) are trained. Although, handicraft centres are also declining because of poor incentives and financing from the state governments.

Map 5: No. of Handlooms Centres and Trainees Trained (2011-12)

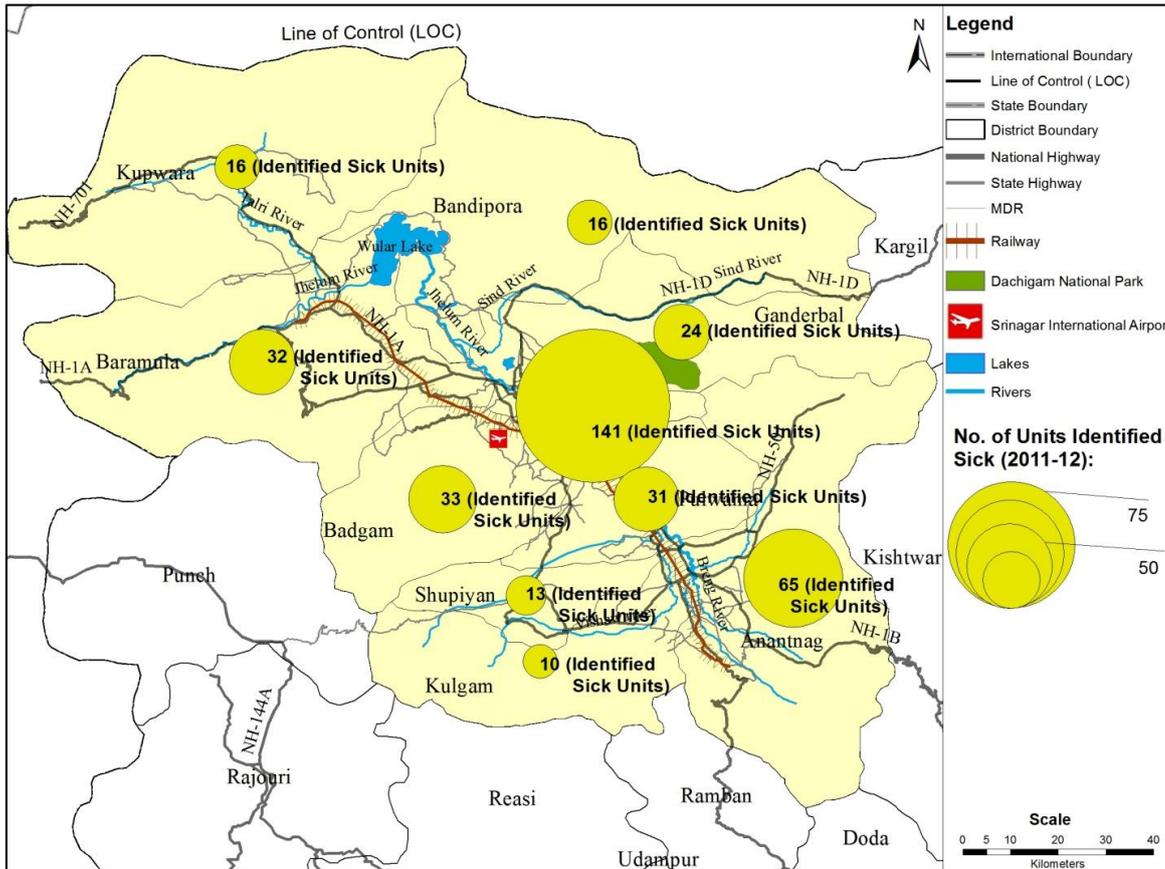


Source: Directorate of Economic and Statistical Department, (DESD), J & K, 2011-12

The handloom occupies a significant place in the socio-economic life of the Kashmir valley. Handloom weaving is one of the skilled professions which needs artistry and craftsmanship. It is known for its specialized weaving of fabrics like pashmina, silk sarees and cotton items. It is also crucial for employment generation for weaker section of the society as it is based on labor intensive cottage Industry. The numbers of handloom centres are more in Srinagar, Baramulla and Kupwara districts and fewer in Shupiyan,

Bandipora and Kulgam districts. Similarly, Kupwara (98), Srinagar (90) and Baramulla (83) are three districts which have a high number of trainees trained whereas the number is fewer in Shupiyan (10), Bandipora (10) and Kulgam (10) districts because of its locational disadvantages. There is needed to upgrade the crafts of skilled and semi-skilled handloom workers particularly in dyeing, weaving and design technology to enhance their productivity and marketability of the products.

Map 6: No. of Identified Sick Industries (2011-12)

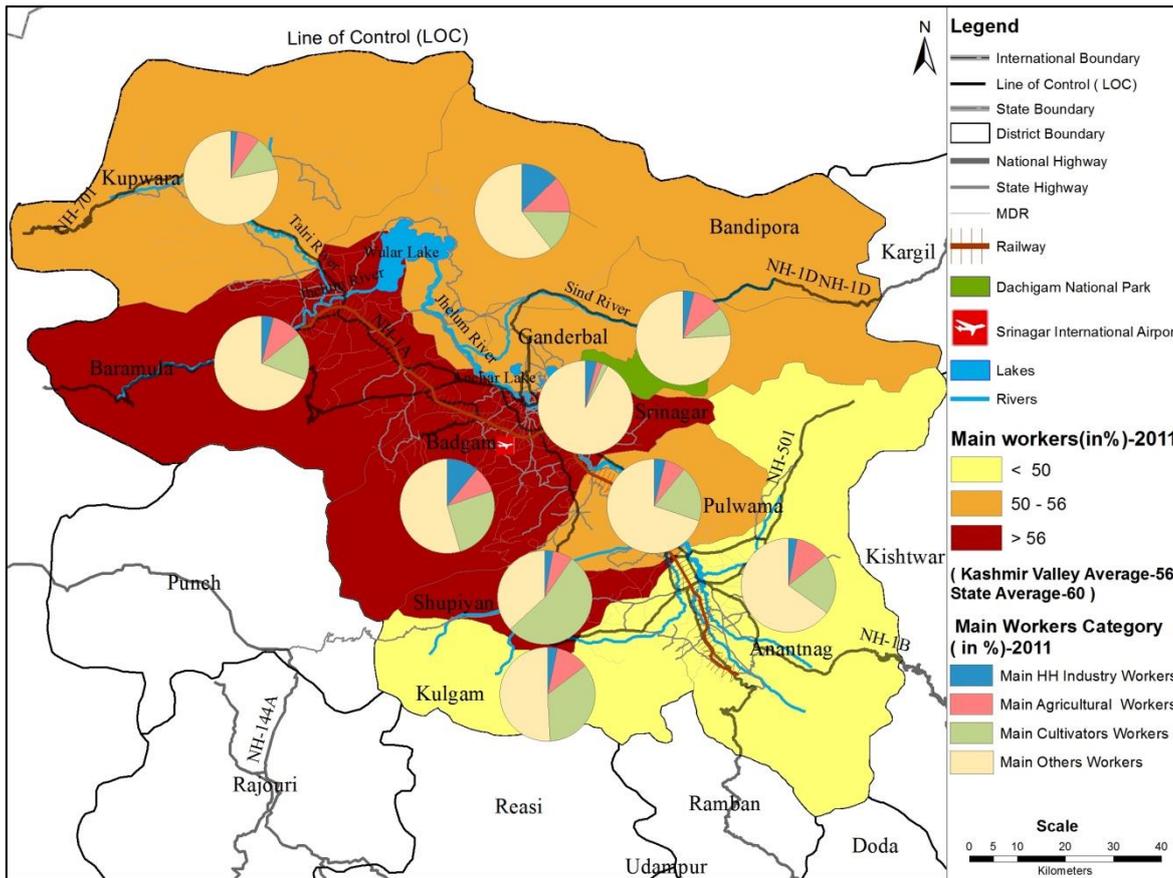


Source: Directorate of Economic and Statistical Department, (DESD), J & K, 2011-12

An industrial unit is called sick when its financial stability is not satisfactory to give its liabilities. It incurs losses and becomes worse year after year. This is the reasons for not paying liabilities by organization at the given time. The increasing trend of industrial sickness can be seen in all types of industrial units and sectors. Srinagar (141), Anantnag (65) and Badgam (33) are three districts where the numbers of industrial sick units are more compared to other districts. These districts are becoming sick on account of

financial crunch, law and order, marketing problems, raw material unavailability, migration, road infrastructure and militancy. There are needed special funds and incentives from the state and central government to these sick industrial units. As the Industrial sector contributes 25.87 percent to gross state domestic product (GSDP) of state at constant prices as per advance estimates for the year 2014-15 (Digest of Statistics, 2013-14).

Map 7: Main Workers and Its Categories (in%)-2011



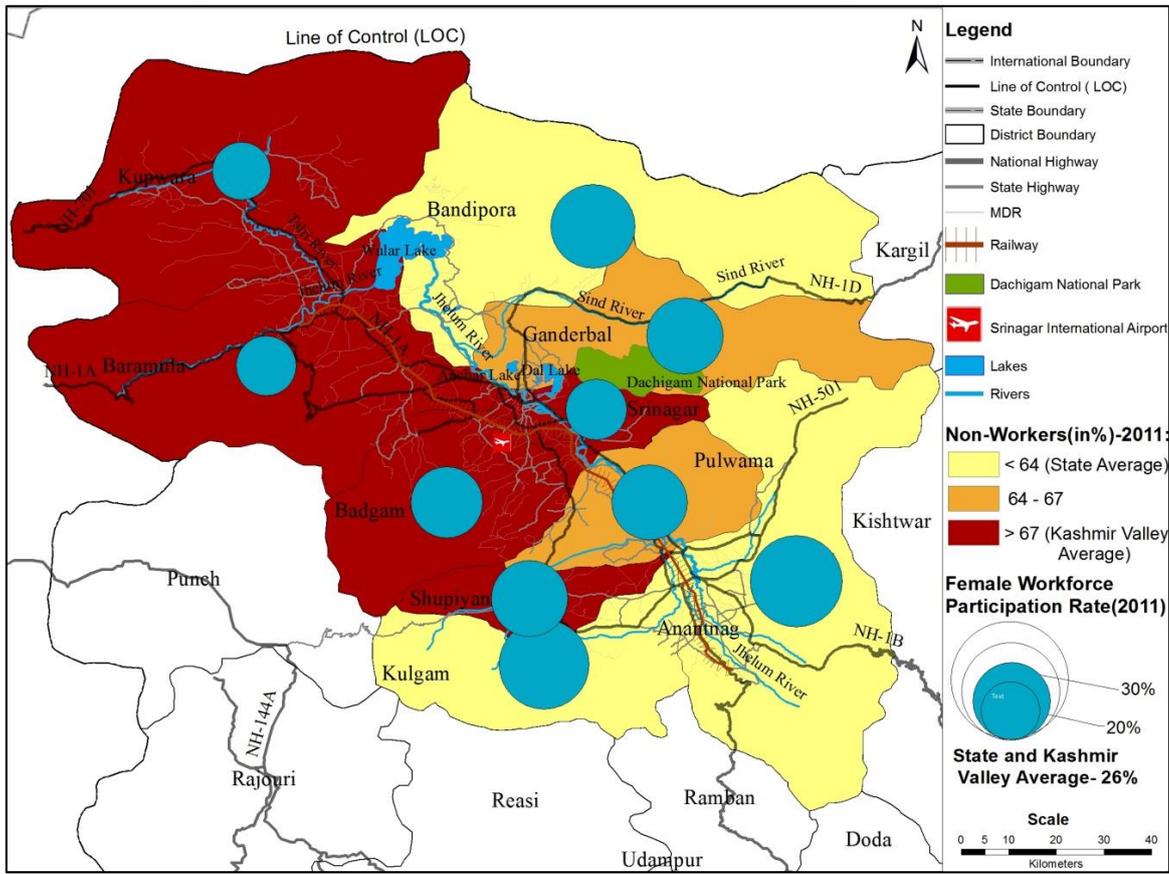
Source: Census of

India, PCA, 2011

The percentage share of main workers was higher than the Kashmir valley average (56%) and state average (60%) in Srinagar, Baramulla, Badgam, and Shupiyan districts whereas Kulgam and Anantnag are the two districts where the percentage share of main worker was below 50 percent in 2011. Shopiyan district has shown highest dependence on cultivation where 53.35 percentage workers are recorded to be cultivators. Srinagar district has shown least dependence on cultivation (2.00 %). In Bandipora district,

percentage main workers are engaged as agricultural labor. Similarly, percentage share of household industry workers is mainly concentrated in Bandipora (12.67%) and Badgam (10.91%). The regional profile reveals that it is Kashmir region which tops with 4.72 percentage followed by Jammu region with 1.30 percentage main workers pursuing household's industry as their principal occupation.

Map 8: Percentage Share of Non-Workers and Female Workforce Participation Rate (2011)



Source: Census of India, Primary Census Abstract, 2011

The percentage share of non-workers is predominantly high in the districts of Badgam, Kupwara, Baramulla, and Shupiyan districts as these have non-workers populations more than the Kashmir valley average(67%) and state average(64%). Non-workers percentage share is lower than the Kashmir valley average and state average in Bandipora, Anantnag and Kulgam districts. Female workforce participation rate is also an important economic indicator in the Kashmir valley. There is high female workforce

IV. CONCLUSION

The Kashmir valley has not been able to attract investments in terms of its industrial development. There is needed a strong industrial base in order to increase and promote the efficiency of small scale industrial (SSI) units, employment generation, handicraft centers, handloom centers, reviving of sick industries, cooperative societies and so on. The geographical location of the valley is such that the setting up of large industries with a large capital base requires huge investment. This region is also affected due to financial crunch, marketing problems, lack of infrastructure and poor governance of the state of Jammu and Kashmir. For instance, the handloom and handicraft centres are also in decline because of poor incentives and financing from the

participation rate in Anantnag, Kulgam, Bandipora, Ganderbal, Pulwama and Shupiyan districts as the whole region of Kashmir valley is oriented towards agriculture. In regional comparison female workforce participation rate is recorded highest in Ladakh region (26.66 %) followed by Jammu with almost the same figure (26.57%) and Kashmir valley with 25.62 percent (Indicators of Regional Development, 2011-12).

state and central governments. Industrial estates are supposed to be developed keeping in mind economic considerations like availability of raw material, human resources, proximity to the market and geographical location etc. In order to encourage investments, government must play a leading role to build up the confidence of the private investors in this region.

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Mitochondrial DNA Variability of Edible Bird Nest Swiftlet (*Aerodramus Fuciphagus*) Colonies In Malaysia.

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Abstract- Edible Bird Nest Swiftlets naturally inhabits the lime stone caves of South East Asia, but recently swiftlet ranching in house farms has become popular. These swiftlets are of great commercial importance because of their unique nest produced wholly from the pair of salivary gland and highly valued for their nutritional, medicinal and aphrodisiac properties. The study elucidates mitochondrial variability information of *A. fuciphagus* by analysing two mtDNA genes (*cytb* and *ND5*). For the mtDNA analysis, DNA samples, extracted from tissue, blood and nests of 28 EBN swiftlets from six locations (Sungkai in Perak, Kuala Terengganu in Terengganu, Tanah Merah in Kelantan, Kota Tinggi in Johor, Gua Madai and Pitas in Sabah) were used. The DNA was subjected to PCR amplification of two mtDNA gene loci namely *cytb* and *ND5*. *Cytb* had the highest variation with eight haplotypes while *ND5* had five. The neutrality tests were negative values for the Tajuma's D and Fu and Li's D. The shared haplotypes indicate high gene flow between locations with two separable groups that are genetically different.

Index Terms – Edible Bird Nest swiftlet, Mitochondrial DNA, Genetic variability, Colonies.

1. INTRODUCTION

Edible Bird Nest (EBN) Swiftlets are small sized insectivorous swifts from the family Apodidae that inhabit limestone caves of many part of South East Asia (Chantler et al., 1999, Marcone, 2005). They are first class flyers flying at high velocity (Videler et al, 2004) and possess the ability to find their way in deep darkness through echolocation, an advantage that make them free visually orienting predators (Fenton, 1975). They are diurnal and have good sight for capturing flying insects during broad daylight (Brinkløvet et.al, 2013). Swiftlets produce edible nest which is highly sought after delicacy among Chinese gourmands.

EBN swiftlet build nest wholly of its secretion from the pair of sublingual salivary glands, constructed without moss, feather or twigs (Marshall and Folley, 2007). Harvesting of EBN from natural wide colonies is dated back to the late sixteenth century by the Chinese society (Lim and Cranbrook, 2002).

EBNs are highly sought after due to their nutritional, aphrodisiac and purported health benefits (Norhayatti et al, 2010, Guo et al, 2006) which includes possessing useful properties that tone up the organs of the body, relieve gastric problems and aids kidney function (Marcone, 2005). The nest is among the most expensive animal product in the world and because of this, there has been great exploitation across the regions (Sankaran, 2001). The local EBN industry has been domesticating these economically important birds there by creating a decline in natural cave populations (Aowphol et al, 2008). Recently, there has been an expansion in the EBN swiftlets house farms due to the construction of numerous large buildings for the purpose of housing large colonies of the birds; this has led to an increased number of birds but may have an adverse effect on the overall population of swiftlets (Chantler and Driessens, 2000, Aowphol et al., 2008). *Aerodramus fuciphagus* have a high degree of nest site fidelity (Nugroho and Whendrato, 1996; Lim and Cranbrook, 2014) and are monogamous breeder (Viruhpintu et al., 2002). Although some growers observed that some other species such as glossy swiftlet (*Collocalia esculenta*), Mossy nest swiftlet (*Aerodramus salangana*) and cave swiftlet (*C. linchii*) are good foster parents and would hatch and rear chicks from eggs of manmade swiftlet farms when transferred into their nest; this act has led to fast establishment of new colonies of EBN swiftlet (Thornburn, 2015). Special consideration has to be given to EBN swiftlet being unique specie and the attempt to increase their numbers, maintaining their genetic stability of the populations is paramount.

Mitochondrial DNA (mtDNA) has been widely used in animal phylogenetic studies because it evolves rapidly more than nuclear DNA, leading to accumulation of differences between closely related species (Mindell et al., 1997). MtDNA divergence have been observed in sister species and more generally "biotic entities registered in mtDNA genealogies and traditional taxonomic assignment tends to converge" (Awise & Walker, 1999). The general concordance of mtDNA trees with specie trees means that

analysing their mtDNA can identify species of specimen (Herbert et al, 2004). Although many species show phylogeographic subdivisions usually uniting into single lineages, sequence divergences are greater among species than within species and thus mtDNA genealogies captures biological discontinuities recognized by taxonomist as species.

Cytochrome b gene (*cytb*) is the most frequently used mtDNA marker (Parson et al, 2000; Burns et al, 2009) and most extensively sequenced gene to date for vertebrates (Irwin et al, 1991). *Cytb* gene is rich in phylogenetic information and there is better characterization of the molecular systems evolutionary dynamics (Esposti et al, 1993). NADH dehydrogenase subunit (*ND5*) genes have been used for avian specie identification and phylogenetic reconstruction based on fewer anomalies (Nakamura, 2009), relative similarities among lineage nucleotide composition and phylogenetic utility in distantly and closely related lineages (Paton and Baker, 2006). Adequate knowledge about the delineation among swiftlet specie in Malaysia is necessary to evaluate genetic variation and its effect on the growing industry on local swiftlet populations. The study aimed to assess mtDNA genes (*cytb* and *ND5*) and elucidate the genetic variability of *A. fuciphagus* across locations in Malaysia.

2. MATERIAL AND METHOD

SAMPLING

Blood samples of EBN swiftlets were collected from house farms at Sungkai Perak (five individual); Tanah Merah, Kelantan (five individuals). Tissues (Dead birds) were collected from house farms at Kuala Terengganu, Terengganu (five individual). Edible nest from house farms at Kota Tinggi, Johor (five), Pitas Sabah (three) and nest from cave at Gua Madai, Sabah (five). Three Pacific swallows (*Hirundo tahitica*) were collected from Sungkai, Perak to serve as an out-group for comparison.

DNA EXTRACTION

Genomic DNA was extracted from blood and tissue samples using the DNeasy blood and tissue kit (Qiagen, California) following the manufacturer's instructions. DNA extraction from the nest was done using the wizard extraction protocol. Two hundred and fifty milligram of dried EBN was weighed and crushed. The powdered samples was placed into 15ml falcon tube and 3ml of extraction buffer (150mM NaCl, 2mM EDTA, 1% SDS (w/v), 10 mM Tris: HCl pH 8.0) was added and mixed. This was followed by addition of 350ml guanidine thiocyanate (Sigma, USA) and 140µl of Proteinase K (>600 mAU/ml). The mixture was incubated at 56°C for 3 h in a water bath. The supernatant was transferred into 2ml micro centrifuge tube and Wizard DNA Clean- Up Resin (Promega USA) was used following the manufacturer's instruction.

PCR AMPLIFICATION AND SEQUENCING

The *cytb* and *ND5* regions of the mtDNA were amplified using the primers *cyt-b258* (5'-CGGAGCCTCATTCTTCTTCA-3') and *cyt-b820* (5'-ATCATTCCGGCTTGATATGG-3') for *cytb*, designed by Aowphol et al, (2008) and F: (5'-CCTATTTTGC GGATGTCTTGTTTC-3'), R: (5'- CAGGAAAATCCGCTCAATTCGG) for *ND5* (Garcia-Moreno et al, 1999). PCR amplification was carried out in 30 µL reactions containing 3 µL of 10X Pfu Buffer with MgSO₄, 0.6 µL (10 mM) dNTP, 0.3 µL (2.5U) of Pfu DNA polymerase, 0.1 µM of each primer and 50 ng of DNA template. The PCR protocol for the amplification of the *cytb* region consisted of an initial denaturisation for 5 min at 95°C, followed by 8 cycles of denaturation at 95°C for 30 s, annealing at 64°C for 30 s, extension at 72°C for 30 s, followed by 29 cycles of denaturation at 95°C for 30s, annealing at 54°C for 30s, extension for 1min at 72°C and a final extension for 10 min at 72°C. The PCR protocol for the amplification of the *ND5* region consisted of an initial denaturisation for 5 min at 95°C, followed by 35 cycles of denaturation at 94°C for 1min, annealing at 64°C for 30 s, extension at 72°C for 30 s, followed by 29 cycles of denaturation at 95°C for 30s, annealing at 50°C for 1min, extension at 72°C for 1min and a final extension for 10 min at 72°C. The PCR products were run in 1.5% low melt agarose gel with ethidium bromide and the gel were viewed under ultraviolet light. Gels were cut and purified using the GeneAll gel purification kit (Korea). Cloning of mtDNA regions was performed using Thermo Scientific CloneJET® PCR cloning kit (Germany). 3 colonies were picked from each sample. Plasmid extraction was done using GeneAll® HYBRID-Q™ PLASMID RAPIDPREP (Korea). The purified plasmids were sequenced using the service provider (First Base Sdn. Bhd., Malaysia).

MtDNA SEQUENCE ANALYSIS

The DNA sequences obtained from the clones were subjected to multiple alignments using BioEdit v7.0.9 software and consensus sequences were generated. Phylogenetic analyses were performed with the aligned sequences using MEGA5 software (Tamura et al., 2011). Best Modal Test (MEGA5) for each gene was determined by picking the lowest Bayesian Identity Criterion (BIC). Jukes-Cantor model was used to test the suitability of the data set for Neighbour Joining (NJ) trees, if average pairwise distance is <1.0, then it is applicable. Calculation of the distance values among mtDNA fragments sequences were done using Tamura – Nei 3 Parameter model based on the BIC value implemented in MEGA5. Performing the bootstrap test of phylogeny, bootstrap replicates of 1000 and the default random seed were used. The haplotype and nucleotide diversity were done using DnaSP version 3 (Rozas and Rozas, 1999). Additional samples of mtDNA fragments of other species were obtained from GenBank for comparison with EBN swiftlets samples used in this study.

3. RESULTS AND DISCUSSION

Aligned DNA sequences of *cytb* region (563bp) revealed a total of 14 polymorphic sites and 8 haplotypes (Tab 1). Among the 28 samples used, haplotype 1 was the most frequent, exhibited by 13 individuals across four locations. The out-group *H. tahitica* also exhibited this haplotype meaning homology is observed in both species. Genetic diversity of mtDNA *cytb* (Tab 2) shows the overall haplotype and nucleotide diversity to be 0.847 and 0.009 respectively. There were no significant differences ($P > 0.10$) in the neutrality test based on the negative value of Tajuma's D and Fu & Li's D ($P > 0.10$). Neighbour Joining tree (Fig 1) constructed shows there were sub-clades with majority of the sequences being tightly associated. Sungkai, Perak and Tanah Merah samples showed close genetic affinities from evidence on the branching pattern. There are no clear evidences of geographical clustering among EBN swiftlets populations. Haplotype 2-8 were in sub-clade separated from *A. fuciphagus amechanus* spp. The DNA sequences have been deposited in GenBank under accession number KJ671364- KJ671391.

A fragment of (418bp) was derived for EBN swiftlets from the amplification of mtDNA *ND5*. Six polymorphic sites and five haplotypes were detected (Tab 3). Haplotype 1 was common to all location. Samples from Kota Tinggi and Sungkai had two unique haplotypes each. There were no significant differences based on the negative Tajuma's D and Fu & Li's D ($P > 0.10$) (Tab 4). Negative values are indicative of a possible departure from neutral expectations. Neighbour joining constructed shows no clear evidences of geographical clustering among population. Haplotypes were grouped into a clade because there were no reference sequences of *A. fuciphagus* for comparison in the GenBank (Fig 2). DNA sequences have been deposited in GenBank under accession number KJ671392-KJ671419. Intraspecific variations observed in *ND5* are due to the slow evolving nature of the gene (Mindell and Honeycutt, 1990).

In *cytb*, the most frequent haplotype were found in samples representing both cave and house population from South of Peninsular Malaysia (Kota Tinggi), East of Peninsular Malaysia (Kuala Terengganu) and East Malaysia (Gua Madai and Pitas) showing a substantial mtDNA gene flow and structured demographic population. These regions of mtDNA have been used to detect structure of populations in many avian species because it evolves relatively fast (Buerkle 1999; Burg and Croxall, 2001). House samples from East Peninsular (Tanah Merah) and North Peninsular (Sungkai) had many variations but with fewer frequency of haplotypes. Majority of the haplotypes (H2 – H8) from the *cytb* are less abundant, less widespread and did not cluster with samples retrieved from the GenBank. The most frequent haplotype was unique suggesting significant genetic distinction and there may be sub-species delineation in the swiftlet population of Malaysia. Phylogenetic tree show that EBN swiftlet form a moderately supported cluster with brown-rump swiftlet *A. fuciphagus vestitus* (BS 79%) and they are different from *A. fuciphagus amechanus* spp. This was supported by Cranbrook et al, 2013, showing that the name *A. fuciphagus amechanus* is not applicable to swiftlet from Peninsular Malaysia. Similar findings of two clades populations were observed in the work of (Goh et al, 2018) among house farm swiftlets in Malaysia, the first clade was samples from across Peninsular Malaysia and Borneo States of Malaysia while the second clade was from Pahang, Malaysia. This was also justified in the conclusion by (Chasen, 1933, 1935) that there are two *Aerodramus* swiftlet making white nests and they are separated by habits which include choice of nesting site.

The Neutrality test values were negative for the gene loci indicating possible departure from neutral expectation. It could be that the population has not yet reached equilibrium with most mutation tending to be unique to a single lineage or that the sample sizes were small. However, negative values were also reported in larger samples in Thailand, indicating high genetic variation within colonies than between colonies (Aowphol et al, 2008).

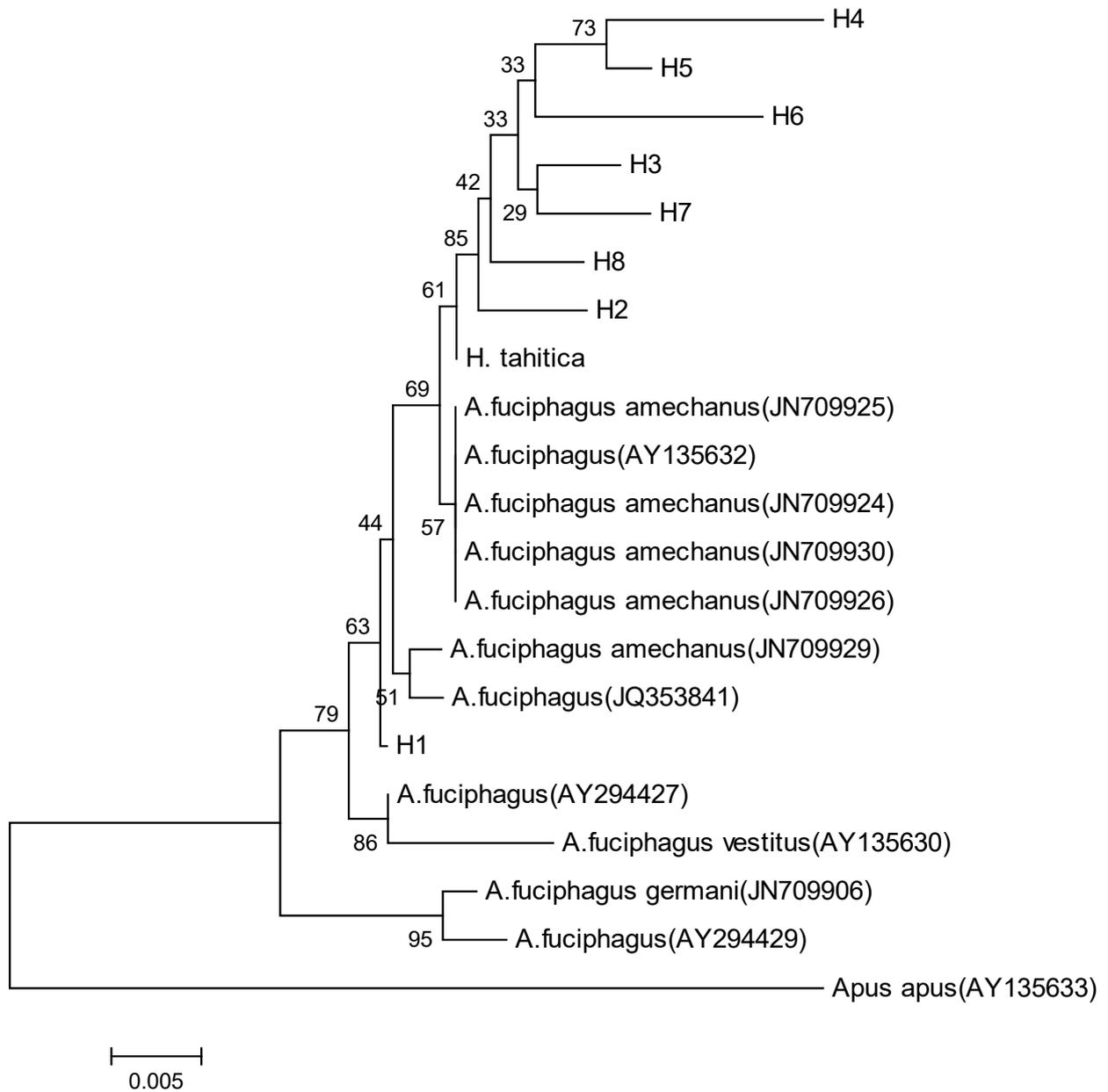


Fig 1. Neighbour Joining phylogenetic trees based on the haplotypes of mtDNA *cytb* locus in *A. fuciphagus*. Haplotypes labelled as *A. fuciphagus* are those retrieved from the GenBank. *Apus apus* was used as an outgroup because *H. tahitica* had similar haplotype sequence as *A. fuciphagus*. Numbers indicate the percentage of confidence level for each node estimated at 1000 bootstrap value.

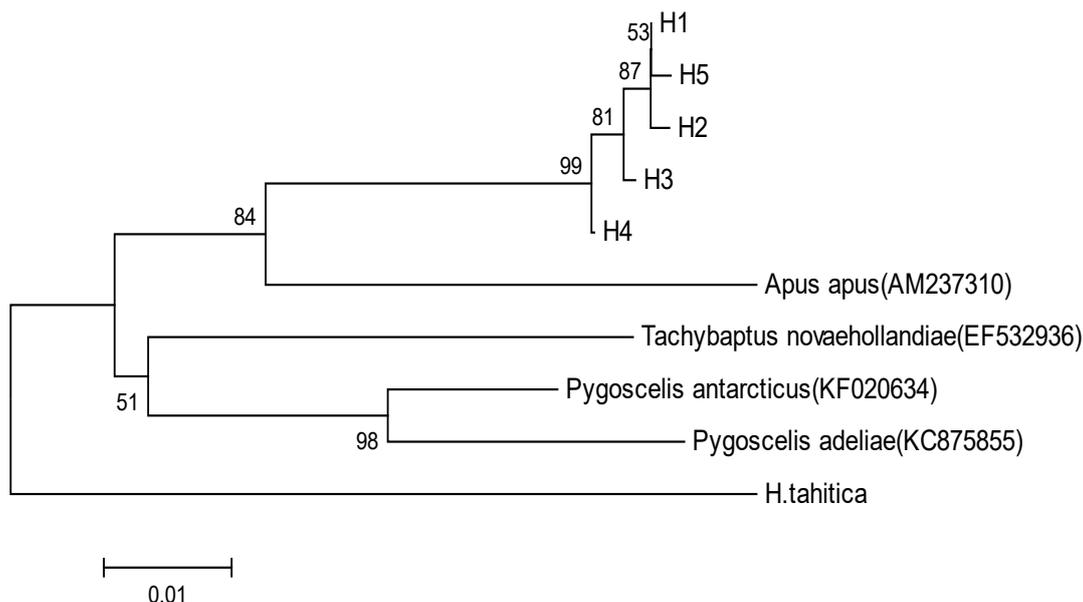


Fig 2. Neighbour Joining phylogenetic trees based on the mtDNA *ND5* gene locus of five haplotypes used in this study and other sequence retrieved from GenBank. *H. tahitica* was used as outgroup. Numbers indicate the Percentage of confidence level for each node estimated at 1000 bootstrap value.

Genetic variation is influenced by a lot of factors such as reproduction, behaviour, migration, population size, natural selection and historical events. There are no natural inland population of white nest swiftlet in Peninsular Malaysia and despite the high number of house farms, EBN swiftlets usually do not revert to cave nesting site (Goh et al, 2018). But with the availability of improved environment and reproductive propensity by man, EBN swiftlets has increased in both number of individuals and the colonies. Initially, they are sourced from natural caves and house farms buildings but more recently, birds in the new buildings may have come from any established colonies in buildings. After earlier population separated from their natural habitat, there was continuity of populations of house farms resulting in homogeneity of their sequence thereby making them to be distinct. EBN swiftlets have high level nest site fidelity which could have led to genetic differentiation but it was not observed in this study. We found lack of genetic structure for EBN swiftlets of Malaysia but both clade (H1 and H2- H8) observed are genetically separable. The result of this study could be used as information to monitor the changes in the genetic variability of the local EBN swiftlet population. Genetic study should not be limited to mtDNA loci, nuclear markers such as microsatellites and SNPs in nuclear DNA should also be used.

Table 1. Haplotypes showing the polymorphic sites, base polymorphism and distribution across locations for mtDNA *cytb* region

Haplotype	Position														Frequency						Total No of samples	% of total no of haplotypes
	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	SP	TM	KT	GM	PT			KG
1	T	T	C	C	C	A	C	C	C	T	A	G	T	A			5	3	1	4	13	46.4
2	C	.	.	.	.	.	.	.	.	.	.	.	.	.				2	2	1	5	17.9
3	.	.	.	T	.	.	.	.	.	G	T	.	C	C	1	1					2	7.1
4	.	.	.	.	G	G	T	.	T	.	.	A	C	.	1	1					2	7.1
5	.	.	.	.	.	C	.	.	T	.	.	C	C	C	1	1					2	7.1
6	.	.	.	.	.	C	.	.	T	.	.	C	.	C	1	1					2	7.1
7	T	.	.	T	.	C	.	A	A	C	C	.	.	.	1						1	3.6
8	C	.	.	T	.	C	.	.	.	.	.	.	.	.	.	1					1	3.6
Total No of Haplotypes															5	5	1	2	2	2	28	100
<i>H. tahitica</i>																					3	

SP- Sungkai, TM- Tanah Merah, GM- Gua Madai and KT- Kuala Terengganu, PT- Pitas, KG- Kota Tinggi. A – adenine, C – cytosine, G- guanine, T – Thymine. Position numbering based on the sequences generated in this study.

Table 2. Genetic diversity indices of the mtDNA *cytb* region in six populations across Malaysia.

Population	N	Polymorphic site	No of haplotype	Haplotype Diversity (H)	Nucleotide Diversity (π)	Tajima's D	Fu and Li's D
Sungkai	5	14	5	1.000	0.017	-0.884	-0.253
Kuala Terengganu	5	5	1	0.700	0.004	-1.124	-1.124
Gua Madai	5	3	2	0.900	0.001	-0.175	-0.175
Tanah Merah	5	14	5	1.000	0.017	-0.340	-0.065
Pitas	3	1	2	0.667	0.001	-	-
Kota Tinggi	5	1	2	0.440	0.001	-0.817	-0.817
Total	28	14	8	0.847	0.009	-1.522	-1.262

Table 3. Haplotypes showing the polymorphic sites, base polymorphism and distribution across location in mtDNA ND5 region

Haplotype	Position						Frequency						Total No of samples	% of total no of haplotypes
	0	1	2	3	3	3	SP	TM	KT	GM	PT	KG		
1	T	C	G	T	C	C	3	5	5	5	3	3	24	85.7
2	.	T	.	.	.	.	1						1	3.6
3	C	.	.	C	.	.	1						1	3.6
4	.	.	.	C	T	A						1	1	3.6
5	.	.	A	.	.	.						1	1	3.6
Total No of Haplotypes							3	1	1	1	1	3	28	100
<i>H. tahitica</i>	.	.	.	C	T	A							3	

SP- Sungkai, TM- Tanah Merah, GM- Gua Madai and KT- Kuala Terengganu, PT- Pitas, KG- Kota Tinggi. A – adenine, C – cytosine, G- guanine, T – thymine. *H. tahitica* – outgroup. Position numbering based on the sequences generated in this study.

Table 4. Genetic diversity indices for the MtDNA ND5 region in six populations across Malaysia

Population	N	Polymorphic site	No of haplotype	Haplotype Diversity (H)	Nucleotide Diversity(π)	Tajima's D	Fu and Li's D
Sungkai	5	3	3	0.700	0.003	-1.048	-1.048
Kuala Terengganu	5	0	1	0.000		-	-
Gua Madai	5	0	1	0.000		-	-
Tanah Merah	5	0	1	0.000		-	-
Pitas	3	0	1	0.000		-	-
Kota Tinggi	5	4	3	0.700	0.004	-1.094	-1.094
Total	28	6	5	0.270	0.001	-1.972	-2.595

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Factors Affecting the Performance of Commerce-Service Enterprises in Can Tho City, Vietnam

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Abstract- The objective of this study is to identify factors affecting the performance of commerce-service enterprises in Can Tho City. The sample size includes 272 active enterprises in the field of commerce and service. The study applied multivariate linear regression to analyze the data. The result showed that factors that have positive impacts on the performance of commerce-service enterprises are professional qualifications of enterprise owners, technology level, social capital, financial accessibility, and support policies. In contrast, the legal environment negatively influences the business performance of commerce-service enterprises. Especially, the technology level puts the strongest impact on the performance of commerce-service enterprises in Can Tho City.

Index Terms- business performance, enterprise, commerce-service.

I. INTRODUCTION

Currently, Vietnam is an official member of ASEAN, CPTPP, CAPEC, ASEM, and WTO. The integration of the international economy, as well as the expansion of relationships with nations and world economic organizations, is an opportunity for Vietnam to be a growing-economic country. Besides the favorable conditions for enterprises to expand the business and access to advanced technology, there is still a great challenge which is the increasingly competitive environment. To survive and develop, every enterprise owner has to pay attention to business performance, especially the factors affecting the enterprise's performance. Studies conducted in many countries have pointed out that the access to finance (Chittithaworn et al., 2011; Kinyua, 2013), the management capacity of business owners (Chachar, 2013; Kamunge et al., 2014), operation years (Sørensen and Stuart, 2000; Zeitun and Tian, 2007), accessibility to information and support policies of the government (Kamunge et al., 2014; Joo and Suh (2017) influence the performance of enterprises. The business community plays an important role in the economy of each country, especially for developing countries, including Vietnam. Enterprises are considered to keep a key role in the economic growth of many countries (Beck et al., 2005; Omar et al., 2009). In a globally competitive environment, enterprises are always facing difficulties and challenges that affect their operational efficiency and sustainable development. The business community, especially commerce-service enterprises operating in Can Tho City are not out of trend. Therefore, this study was conducted to identify factors affecting the performance of commerce-service enterprises in Can Tho City. Indicating

factors impacting the performance of an enterprise is essential. It may be a scientific basis for managers to find out appropriate strategies to improve future performance.

II. RESEARCH HYPOTHESES

The relationship between the business owner's level of education and the enterprise's performance. The study by Nghi & Nam (2011) has shown that the education level of business owners has a positive impact on the performance of businesses. With the same perspective, Blackburn et al. (2013) have demonstrated that the higher the education level of business owners, the better performance of businesses. Since then, the study proposes hypothesis H1: The professional qualifications of managers positively impact the performance of commerce-service enterprises.

The relationship between the management experience and the performance of the enterprise. According to Kamunge et al. (2014), Chachar (2013), there is a positive relationship between management experience of managers and their enterprises' performance. Besides, Chittithaworn et al. (2011), Sitharam & Hoque (2016) have demonstrated that managerial skills and experience of business owners have a positive impact on firm performance. Thus, the study hypothesis H2 is as follows: The management experience positively affects the performance of commerce-service enterprises.

The relationship between operation years and the operational efficiency of enterprises. As reported by Sørensen & Stuart (2000), Zeitun & Tian (2007), years of operation affect the performance of an enterprise. In addition to this, Nghi & Nam (2011) pointed out that the number of operation years is a factor that positively affects production and business performance. Therefore, the hypothesis H3 is set out: Operation years positively influence the performance of commerce-service enterprises.

The relationship between the scale of an enterprise and its performance. Studies by Kokko & Sjöholm (2004), Zeitun & Tian (2007), Javed et al. (2011) have confirmed that business scale affects business performance. According to Nghi & Nam (2011), Anh (2014), Tan et al. (2015), an enterprise's size impacts its performance positively. Hence, the study suggests the hypothesis

H4: The business size has a positive impact on the performance of commerce-service enterprises.

The relationship between asset structure and business performance. According to Nhut & Thao (2014), the ratio of fixed assets to total assets affects the performance of enterprises. Similarly, Zeitun & Tian (2007), Onalapo & Kajola (2010) said that the ratio of fixed assets to total assets harms enterprises' performance. Thus, the study hypothesizes H5: The asset structure negatively affects the performance of commerce-service enterprises.

The relationship between technology application and operational efficiency of enterprises. Arinaitwe (2006), Sitharam & Hoque (2016), Nhut (2014) have suggested that the application of advanced technologies into business production helps enterprises improve productivity, reduce costs, and increase efficiency. Therefore, the hypothesis H6 is proposed as follows: The application of technology has a positive impact on the performance of commerce-service enterprises.

The relationship between the revenue growth rate and operational efficiency of enterprises. The study by Nghi & Nam (2011) has found out the positive impact of revenue growth rate on enterprises' performance and development. Also, Zeitun & Tian (2007) argued that the revenue growth rate favorably affects the performance of enterprises. From the above discussion, hypothesis H7 is as follows: The revenue growth rate has a beneficial impact on the performance of commerce-service enterprises.

The relationship between social capital and enterprise performance. Research by Fatoki (2011) has proved that social relationships positively influence the business performance of enterprises. Similarly, researches by Tan et al. (2015), Nghi & Nam (2011) showed that social capital is very important for the development of enterprises and positively affects their performances. Since then, the study sets out H8: The social capital positively contributes to the performance of commerce-service enterprises.

The relationship between financial accessibility and the performance of enterprises. According to Acquah & Table 1: Interpretation of observed variables in the research model

Mosimanegape (2007), Okpara & Wynn (2007), Chittithaworn et al. (2011), Kinyua (2013), Kamunge et al. (2014), Sitharam & Hoque (2016), financial accessibility contributes to improving financial resources of enterprises, positively affecting the efficiency of business activities. Therefore, the hypothesis H9 is made: The accessibility to finance beneficially affects the performance of commerce-service enterprises.

The relationship between support policies and the performance of enterprises. According to Thuong & Chung (2015), Hung & Thuy (2015), the government's support policies have a great influence on the performance of enterprises, thereby motivating enterprises to make investment expansion decisions. In agreement with the above findings, Kamunge et al. (2014), Joo & Suh (2017) showed that the support from the government is one of the factors affecting the performance and the ability to expand the scale of businesses. Therefore, the study offers the hypothesis H10: Support policies positively impact the performance of commerce-service enterprises.

The relationship between the legal environment and the performance of enterprises. Mwangi et al. (2013), Kamunge et al. (2014), Sitharam & Hoque (2016) confirmed that the legal environment plays an important role, affecting the performance of enterprises. Negative issues in the legal environment adversely affect the performance and development of the business community. Hence, the hypothesis H11 is given: The legal environment has a negative influence on the performance of commerce-service enterprises.

To identify factors affecting the performance of commerce-service enterprises, the research model is set up as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11}$$

In which: Dependent variable (Y) is the business performance (measured by ROA, ROE, ROS). X_i are independent variables (explanatory variable).

No.	Observed variable	Interpretation	Expectation
1	The manager's level of education	Get value corresponding to the manager's education level: 1 = Intermediate or lower, 2 = College, 3 = University, 4 = Postgraduate	+
2	Management experience	Measured by the number of years directly involved in the management of the manager (year)	+
3	Operation time	Measured by the number of operation years of the enterprise up to the time of the study (year)	+
4	Business size	Get the value corresponding to the size of the enterprise: 1 = micro, 2 = small, 3 = medium, 4 = large.	+
5	Asset structure	Fixed asset/total asset of the enterprise at the time of the study (%).	-
6	Technology level	Get the value corresponding to the level of technology application into the operation. Measured by the 5-level Likert scale.	+
7	Revenue growth rate	Measured by revenue growth of the following year compared to the previous year (%).	+
8	Social capital	The relationship between the enterprise and regulatory agencies or associations. Measured by 5-level Likert scale,	+

No.	Observed variable	Interpretation	Expectation
9	Financial access	The total amount that the enterprise can borrow from credit institutions (billion VND).	+
10	Support policy	Get the value corresponding to the accessibility to support policies. Measured by the 5-level Likert scale.	+
11	Legal environment	Get the value corresponding to the favorable level of the legal environment. Measured by the 5-level Likert scale.	-

Source: Authors' proposal, 2019

III. RESEARCH METHODOLOGY

To test the research hypotheses, the multivariate linear regression was used to determine affecting factors and the impact degree of each factor on the performance of commerce-service enterprises.

According to Green (1991), Tabachnick & Fidell (1996), the minimum sample size in the regression analysis is calculated using the formula $50 + 8m$ (where m is the number of independent variables). The research model is established with 11 independent variables which means the minimum sample size should be 138 observations. The quota sampling was applied to collect primary data with a sample size of 272 enterprises. Enterprises were surveyed about basic information, employment situation, fixed

asset, capital, revenue, profit, operation time, accessibility to support policies.

IV. RESEARCH RESULTS AND DISCUSSIONS

Based on Table 2, the research model has a significance level of $Sig.F = 0.000$ which means that there is a linear relationship between the performance of enterprises (measured by ROA, ROE, ROS) with at least one of the independent variables. The multicollinearity test result shows that VIF values are all less than 10. Therefore, the research model does not reach multicollinearity. The Durbin Watson coefficient is in the allowed range (between 1 and 3). It is possible to conclude that the research model does not violate autocorrelation.

Table 2: Research hypotheses test result

Factor	ROA		ROE		ROS	
	Unstandardized value (B)	Significance level Sig.	Unstandardized value (B)	Significance level Sig.	Unstandardized value (B)	Significance level Sig.
Constant	-0.315	0.000	-0.372	0.000	-0.392	0.000
The manager's level of education	0.030	0.002***	0.030	0.004***	0.054	0.002***
Management experience	0.001	0.388 ^{ns}	-6.968E-006	0.997 ^{ns}	0.000	0.879 ^{ns}
Operation years	-0.002	0.303 ^{ns}	-0.001	0.571 ^{ns}	-0.003	0.439 ^{ns}
Business size	-3.534E-005	0.998 ^{ns}	0.002	0.886 ^{ns}	0.018	0.452 ^{ns}
Asset structure	-0.001	0.864 ^{ns}	0.004	0.622 ^{ns}	0.001	0.939 ^{ns}
Financial access	-6.718E-005	0.904 ^{ns}	0.001	0.036**	0.001	0.497 ^{ns}
Revenue growth rate	-0.001	0.616 ^{ns}	0.000	0.859 ^{ns}	0.003	0.342 ^{ns}
Social capital	0.017	0.059*	0.022	0.034**	-0.008	0.633 ^{ns}
Technology level	0.038	0.000***	0.040	0.000***	0.052	0.003***
Support policy	0.045	0.001***	0.057	0.000***	0.047	0.065*
Legal environment	-0.031	0.005***	-0.032	0.009***	-0.030	0.146 ^{ns}
Adjusted R ²		0.480		0.230		0.507
Sig.F		0.000		0.000		0.000
Durbin – Watson stat		2.159		1.894		2.152

Note: *Significance level 10%; **: Significance level 5%; ***: Significance level 1%; ^{ns}: Not significant

Source: Survey data of 272 enterprises, 2019

According to the above table, out of 11 factors included in the research model, 5 factors explain the change of ROA, 6 factors explain the fluctuation of ROE, and 3 factors affect the change of ROS. The impact degree of each factor is presented below.

The education level of the manager: This factor positively affects the performance of commerce-service enterprises. If the owner has high professional qualifications, he or she has a better strategic vision and orientation for the development of the enterprise. Also, managers easily recognize opportunities and challenges. Therefore, the business performance will be

improved. This result is consistent with the findings of Nghi & Nam (2011), Blackburn et al. (2013).

Technology level: The technology level has a beneficial impact on the performance of commerce-service enterprises. This is consistent with the proposed hypothesis in the model. A high level of technology is reflected by the application of modern technologies in the production, management, and sales activities. It helps enterprises save resources, reduce costs, and improve customer relationship management, thereby enhancing

operational efficiency. This result is similar to the study of Arinaitwe (2006), Sitharam & Hoque (2016), Nhut (2014)

Social capital: This factor positively affects the performance of enterprises (ROA and ROE). Enterprises that have good relationships with regulatory bodies and associations will have more favorable conditions to access market information and support policies. This helps enterprises expand production activities and markets. The discovery corresponds to those of Fatoki (2011), Nghi & Nam (2011).

Financial accessibility: This factor influences the performance of commerce-service enterprises beneficially. If an enterprise has good accessibility to finance, the financial resources will be improved and the manager will be more proactive in expanding the production scale and investing in new technologies. Hence, it enhances the business scale and competitiveness of enterprises. This result is consistent with the studies of Chittithaworn et al. (2011), Kinyua (2013), Kamunge et al. (2014), Sitharam & Hoque (2016).

Support policies: These policies positively impact the performance of commerce-service enterprises. When the government offers support policies related to interest rate, technology, or tax, etc., it encourages enterprises to reduce costs, improve both resources and operational efficiency. Especially for

small and micro-enterprises, support policies help them access the technology and expand the business. The research result is similar to those of Kamunge et al. (2014) Thuong & Chung (2015), Joo & Suh (2017).

Legal environment: The legal environment negatively affects the production efficiency and business activities of enterprises. The study confirms that many enterprises face difficulties in production activities due to administrative procedures are unreasonable, overlapping, and cumbersome. The more complicated the procedures are, the more negatively they affect the performance of enterprises. This finding agrees with the results of Mwangi et al. (2013), Kamunge et al. (2014), Sitharam & Hoque (2016).

V. CONCLUSION

Overall, the study has proved factors affecting the performance of commerce-service enterprises in Can Tho City. In particular, the qualifications of the manager, technology level, social capital, access to finance, and support policies positively affect the performance of commerce-service enterprises. Meanwhile, the legal environment negatively impacts the business performance of these enterprises. Most importantly, the technology level is the most powerful factor affecting the performance of commerce-service enterprises in Can Tho City.

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Amazement of Complex Integration

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Abstract- In this article, we discuss the facts and wonders of complex integrations. We describe the differences between integrations and complex integrations. These differences show the wonders of complex integrations.

Index Terms- complex integration, analytic function, smooth curve, Residue, Laurent series, integrable, derivative.

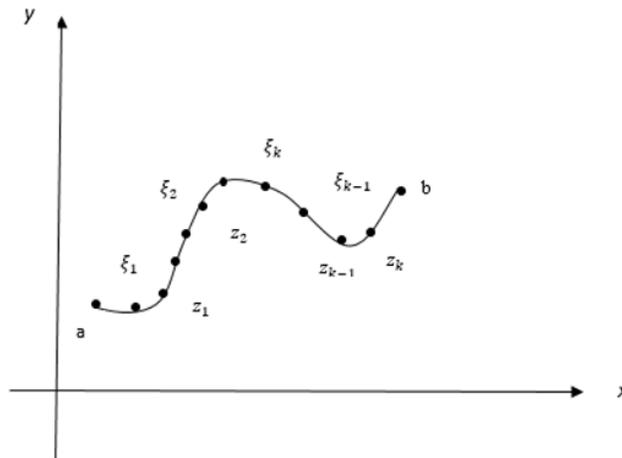
I. INTRODUCTION

In general, we have no rules (techniques) to integrate the complex functions regardless of exceptions. As we know, there are many rules for the integration of real functions, even so, they are not applicable in the field of complex functions, and there aren't any special rules. Therefore, we aim to use the techniques that describe the value of the given integral is equal or less than of some quantity, but sometimes it is not easy to use the techniques or change the form of the questions for conformity to the relevant criteria because it is essential to know many other conditions and criteria. This article examines the wonders of mixed integrals, which are effective in integrating, and the tricks we use instead of integrating methods.

II. BACKGROUND

Integrating on a path: Integration of complex-valued functions of a complex variable are defined on curves in the complex plane, rather than on just intervals of the real line. Classes of curves that are adequate for the study of such integrals are introduced in this article.

let $x(t)$ and $y(t)$ be continuous real-valued functions of a real variable t in $[a, b]$, Assume that C is a smooth curve with equation $(C): z(t) = x(t) + iy(t)$, $t \in [a, b]$



If $f(z)$ be a continuous function on C , in the integral $[a, b]$, then the desired integral can be set to points $a = t_0, t_1, \dots, t_n = b$ where $t_0 < t_1 < \dots < t_n$, and this causes the C curve to be presented to z_0, z_1, \dots, z_n where $z_i = z(t_i)$. Suppose $\Delta z_i = z_i - z_{i-1}$ and ξ_i be the desired point between z_i and z_{i-1} , then the sum will be:

$$s_n = \sum_{k=1}^n f(\xi_k) \Delta z_k$$

Let the number of subdivisions n increase in such a way that the largest of the chord lengths $|\Delta z_k|$ approaches zero. Then, since $f(z)$ is continuous the sum s_n approaches a limit which does not depend on the mode of subdivision and we display this limit like $\int_a^b f(z) dz$ or $\int_c f(z) dz$

Which called the complex line integral or simply line integral of $f(z)$ along the directional curve C , or the definite integral of $f(z)$ from a to b along curve C . in such case, $f(z)$ is said to be integrable along C . if $f(z)$ is analytic at all points of a region \mathfrak{R} and if C is a curve lying in \mathfrak{R} , then $f(z)$ is continuous and therefore integrable along with C . [11]

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suppose that the function $f(z)$ across the arc area $R_1 < |z - z_0| < R_2$, with the analytical center z_0 , and C represents the simple and closed path (Jordan curve) in a positive direction around z_0 , located in this area (as shown in Figure In this case, at any point z of that area, $f(z)$ has a series representation. [10]

$$f(z) = \sum_{n=0}^{\infty} a_n(z - z_0)^n + \sum_{n=0}^{\infty} \frac{b_n}{(z - z_0)^n} \quad (R < |z - z_0| < R_2)$$

Where:

$$a_n = \frac{1}{2\pi i} \int_C \frac{f(z) dz}{(z - z_0)^{n+1}} \quad (n = 0, 1, 2, \dots) \quad , \quad b_n = \frac{1}{2\pi i} \int_C \frac{f(z) dz}{(z - z_0)^{-n+1}} \quad (n = 1, 2, \dots)$$

TOPIC ANALYSIS: It is important to understand the techniques of integrations of real-valued functions although they are not applicable for complex integrations. The issue that makes complex integration more complicated is that we don't know what we get by integrating from a curve or integrating from a shape. The length of a curve, area of a plane, and volumes can be obtained by definite real integrations and indefinite integration is studied as the inverse of derivatives, which allow us to guess the value of integral, but the complex integration is neither inverse of derivative nor calculation of the length of curve, area or volume. Let start by describing the following theorem

THEOREM: if G be a region contained a smooth curve C and $f(z)$ be a continuous function on G , then $f(z)$ is integrable on whole C . [9]

THEOREM: if $w(t)$ is a piecewise continuous complex-valued function defined on an interval $a \leq \theta \leq b$, [10] then

$$\left| \int_a^b w(t) dt \right| \leq \int_a^b |w(t)| dt \quad (a \leq b)$$

As an example, let C be right half of a circle $|z| = 2$ from $z = -2i$ to $z = 2i$. Calculate the value of integral $I = \int_C \bar{z} dz$, $z = 2e^{i\theta}$ ($-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$).

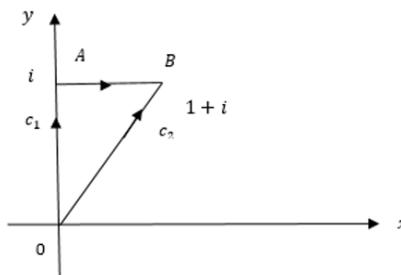
so

$$I = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \overline{2e^{i\theta}} (2e^{i\theta})' d\theta = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} 2e^{-i\theta} 2ie^{i\theta} d\theta = 4i \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} d\theta = 4\pi i$$

Here, the impressive points are, the calculation of integral is definite, integration is on a circle, and integration is on the circle bounded from $z = -2i$ to $z = 2i$. otherwise, there is no physical or geometrical analysis. [12]

The interesting point at the figure below is that we get different results of moving from O to B , but according to vector analysis, the direction c_1 and c_2 must be the same. Therefore, the path is important in complex integrations.

First, calculate the integral on c_1 which is the curve OAB



$$\int_{c_1} f(z)dz = \int_{0A} f(z)dz + \int_{AB} f(z)dz , \quad \int_{c_2} f(z)dz = \int_{0B} f(z)dz$$

The physical and geometrical analysis of the differential and integral calculus is that these two paths must have the same result, but in practice, it seems that these two integrals are not the same. It means $\int_{c_1} f(z)dz \neq \int_{c_2} f(z)dz$ and the function is: [10]

$$f(z) = y - x - i3x^2 \quad (z = x + iy).$$

$$\int_{0A} f(z)dz = \int_0^1 yidy = i \int_0^1 ydy = i \frac{1}{2}$$

$$\int_{AB} f(z)dz = \int_0^1 (1 - x - i3x^2) 1dx = \int_0^1 (1 - x) dx - 3i \int_0^1 x^2 dx = \frac{1}{2} - i$$

$$\int_{c_2} f(z)dz = \int_0^1 -i3x^2(1 + i)dx = 3(1 - i) \int_0^1 x^2 dx = 1 - i$$

Even though started points and ended points of both directions are the same. The value of integral of $f(z)$ in one direction is different with the other. Therefore the value of integral $f(z)$ on direction OABO or $c_1 - c_2$ is not equal to zero:

$$\int_{c_1} f(z)dz - \int_{c_2} f(z)dz = \frac{-1 + i}{2}$$

Since we got different results, it may imply that the calculation purpose is obtaining the length of the curve, but we will see that the calculation of integral is dependent on the initial point and terminal point not to the direction of the path. As c_1 and c_2 have the same initial point and terminal point, and the result of integral are different it shows that integration is related to the path. But see the problem below. Here, we consider that C is an arbitrary smooth curve such as $z = z(t)$, ($a \leq t \leq b$) at initial point $z(a) = z_1$ to terminal point $z(b) = z_2$, to calculate the value of integral:

$$I = \int_{c_2} f(z)dz = \int_a^b z(t)z'(t)dt = \frac{[z(t)]^2}{2} \Big|_a^b = \frac{[z(b)]^2 - [z(a)]^2}{2} = \frac{z_2^2 - z_1^2}{2}$$

It is obvious that the integration of real-valued functions is not independent of the form of the curve, but in complex integrations, especially the above relation, it depends on the initial point and terminal point and independent from the form of the curve. In the previous example, we observed that the result of integration depended on the form of the curve and independent of initial and terminal points. Although the initial and terminal points were the same, the values of the integration of various paths were different. [5]

To generalize the issue for uneven curves, we can divide the curve C to the limit number of smooth curves $c_k (k = 1, 2, \dots, n)$ which ended point of one is the started point of the other. In other words, we assume that the curve c_k is continued from z_k to z_{k+1} . We can write

$$\int_c z dz = \sum_{k=1}^n \int_{c_k} z dz = \sum \frac{z_{k+1}^2 - z_k^2}{2} = \frac{z_{n+1}^2 - z_1^2}{2}$$

As a result, if C is a piecewise smooth curve such that connects two points z_0 and z , then we have

$$\int_c z^n dz = \frac{1}{n+1} (z^{n+1} - z_0^{n+1})$$

Therefore, if C is a closed curve, the value of integration is zero because here we have $z^{n+1} = z_0^{n+1}$. In the case of integration, if we are dealing with a curve that is not closed but smooth, then it is possible to integrate it simply, but for the uneven curve, we have to partition the curve to the smooth curves $c_k (k = 1, 2, \dots, n)$ and integrate from each curve and the summation of values is same as the value of integral C. As a result, the integration of $f(z) = z$ is on the closed curve is zero (compare to one of the previous examples that the integration on the closed curve was not zero) [2]

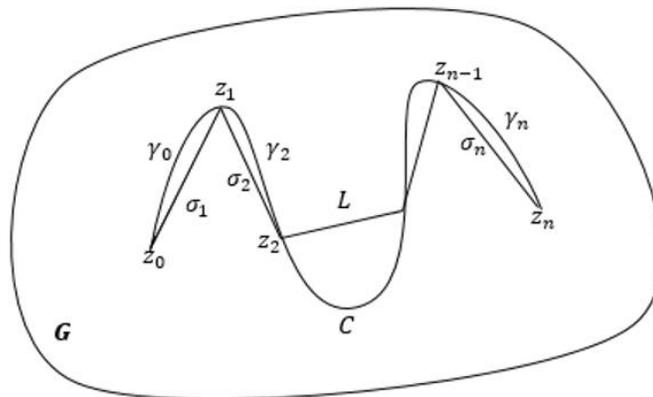
Theorem: let $f(z)$ be a continuous function on smooth curve C which is contained on region G, then $f(z)$ is integrable on the length C.

Theorem: Suppose $f(z)$ is integrable along a curve C having finite length L and suppose there exists a positive number M such that $|f(z)| \leq M$ on C then $|\int_C f(z)dz| \leq ML$. [12]

The theorem does not say anything about the exact value of the integral, but it helps us to recognize the value of the integrals which are less than or equal to some real or complex values. if we compare this method with methods on the integration of real-valued functions, this would not be an appropriate method but in complex integration, this is valuable because here we have no formula to calculate the integral of a complex function. The method is useful not only for calculation of the approximate value of the integral of some function but also is useful to prove many theorems of complex integration. The theorem paves the way to prove the related theorem and to realize the related problems.

Theorem: let $f(z)$ be a continuous function on piecewise smooth curve C which is contained on region G , then for every $\epsilon > 0$ there is a polygon in C which is surrounded by L such that

$$\left| \int_C f(z)dz - \int_L f(z)dz \right| < \epsilon$$

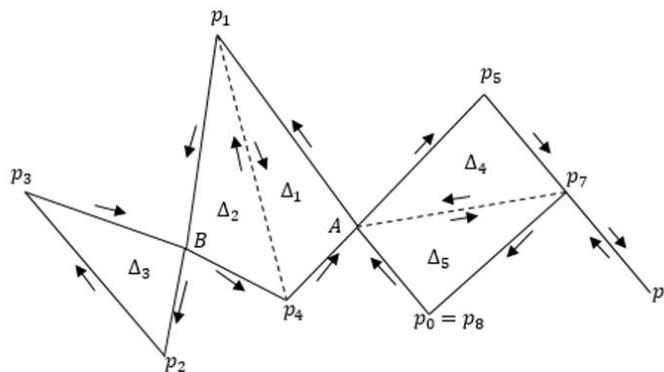


we cannot integrate $f(z)$ on curve C , we will be able to cover the curve C by another curve like L such as the curve C must be located on the same region and also $f(z)$ be continuous on the piecewise smooth curve L , by doing this we are assured that the integral of the function $f(z)$ is the same as integral on C . [3]

Theorem: let the function $f(z)$ be continuous on the connected and simple region G which contained the polygon L then [4]

$$\int_L f(z)dz = \int_{\Delta_1} f(z)dz + \int_{\Delta_2} f(z)dz + \dots + \int_{\Delta_n} f(z)dz$$

Here, the curves $\Delta_1, \Delta_2, \dots, \Delta_n$ are the borders of triangles which are located on the region G



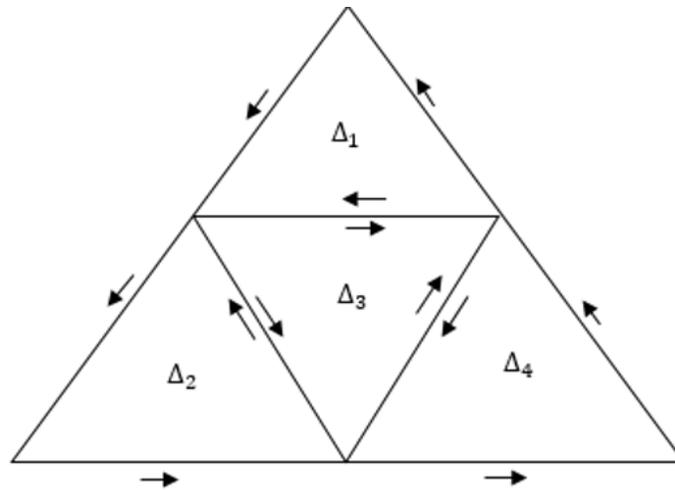
closed polygonal shapes are interchangeable to triangles. We divide them into triangles and apply integration on every triangle and collect the values of integral then the result would be the same as to the integral of a function on a region closed polygonal shapes. When we divide the shape into triangles and integrate from every side of the triangle. We may think that two times integration from the same sides of triangles will arose the value of integral much bigger, but fortunately, our assumption is not true. It is interesting to know that the integral value of those sides which are common between to triangles will be eliminated because it would be integrated

twice with the opposite directions and integral of the same side with opposite direction eliminate each other. In this manner we will get the actual value of the integral on curve C. here the partition of the shape in triangles let us calculate the integral without leaving a footprint, this trick is as good as the catalyst in chemistry (a substance that increases the rate of a chemical reaction without itself undergoing any permanent chemical change).

When we limit the region inside of another connected simple closed region G such that the function $f(z)$ which is continuous on closed curve L, we apply the same method in definite integral in real-valued functions although these two are not comparable because if we divide any area in some shapes then integrate every shape and collect the values, In fact, we collect the areas, but here if we ask, do we get the area in this method in complex integration? Unfortunately, we have no answer to this question.

Theorem: if a function $f(z)$ is analytic at all points interior to and a simple closed contour C, then [11]

$$\int_C f(z) dz = 0$$



The theorem is proved by using triangles such that the region G supposed to be a triangle and the triangle divided into three triangles and continued like that up to n, now we can conclude that in a region which has Regular geometric shape we can apply this method and calculate the value of integral. Cauchy integral's formula led us to any closed curve which satisfies the conditions of the theorem instead of searching any other methods. we can apply the theorem and in this case, the value of the integral is always zero.

The generalization of the Cauchy integral formula shows that if the function $f(z)$ is analytic in a region I and just continuous in \bar{I} , the value of integral will be again zero [7]

$$\int_C f(z) dz = 0$$

This is known as the generalization of Cauchy integral formula.

THEOREM: The advantage of this theorem is that we will be able to consider the region as an Irregular shape and all the curves that are located inside of the region D can also be an Irregular shape, the only limitation is that the curves must not intersect and overlap each, and C_0 contain all the curves C_1, C_2, \dots, C_n where C_0 and C_1, C_2, \dots, C_n are Jordan and piecewise smooth curves and also the set of the curve which are inside of the C_0 makes a $(n + 1)$ connected domain such that the border of the region is supposed to be the borders of $n+1$ Jordan curves. Assume that the functions $f(z)$ is analytic on \bar{D} , by theorem we can take the irregular shapes D and divide it to the sub regions C_1, C_2, \dots, C_n and calculate the integral, this method can help us to calculate the integral of irregular shapes. [6]

$$\int_{C_0} f(z) dz = \int_{C_1} f(z) dz + \int_{C_2} f(z) dz + \dots + \int_{C_n} f(z) dz$$

CAUCHY'S INTEGRAL FORMULA: If we present the form of the related functions as $\int_C \frac{f(z)}{z-z_0} dz$ we have come up with the best possible answer, which means that we can claim that the value of integral is $2\pi i$, it means $\int_C \frac{f(z)}{z-z_0} dz = 2\pi i$. we assume that the function $f(z)$ is analytic on region G which contains the Jordan, closed and piecewise smooth curve C and z_0 is also included. [10]

Alongside this, it relates the values of $f(z)$ inside C to the values of $f(z)$ on the C curve. Note that, if z_0 is outside C , then $\frac{f(z)}{z-z_0}$ is analytical in and around c and therefore according to Cauchy's integral theorem. we have $\frac{1}{2\pi i} \int_c \frac{f(z)}{z-z_0} dz = 0$.

Now, another interesting point is that if we assume (Mora's theorem) that the function $f(z)$ in the G region is continuous and the curve C of the Jordan curve is a smooth part, and also the function $f(z)$, in all sub-regions, the closed part is a smooth. C located in G has properties $\int_{C_i} f(z) dz = 0$ In this case, the function $f(z)$ in G is analytical. [10]

THE DERIVATIVE OF ANALYTIC FUNCTIONS: We can make a conclusion from Cauchy's integral formula that if a function is analytic at a point then the derivatives of any degree exist and analytic at that point. Luckily the derivatives of analytic functions are another helpful way for calculation of complex integrals and in this method, we may often use the series like Laurent series so the first and second derivative of analytic functions are [11]

$$\int_c \frac{f(s)}{(s-z)^2} ds = f'(z)2\pi i \quad , \quad \int_c \frac{f(s)}{(s-z)^3} ds = f''(z)\pi i$$

Therefore, in general, we write

$$\int_c \frac{f(s)}{(s-z)^3} ds = 2\pi i f^{(n)}(z) \frac{1}{n!}$$

Where z is included, the curve C and S show the point, which is on the boundary, points of C .

RESIDUES: The residue is the most powerful method for complex integration in this case, we need to know the Laurent series and based on this series we have to extend the functions as series and find b_1 and after that, we can easily calculate the required complex integral, as we know in Laurent series we have a_n and b_n which are the coefficient of the Laurent series, there is no need to introduce and calculate a_n only the formula of b_n is enough which is [10]

$$b_n = \frac{1}{2\pi i} \int_c \frac{f(z) dz}{(z-z_0)^{-n+1}} \quad (n = 1, 2, \dots)$$

Where $n=1$ we have $b_1 = \frac{1}{2\pi i} \int_c f(z) dz$ which is the best way to calculate $\int_c f(z) dz$.

The complex number b_1 is the coefficient of $\frac{1}{z-z_0}$ in Laurent series and called the residue of the function $f(z)$ at a singular z_0 and write as $Res f(z)$.

Without any exceptional conditions that we have faced in very simple functions, we have no other way around to calculate the complex integral therefore the method of residue is very useful for complex integrations.

If we realize the method of residue we would see the attraction, the procedure of calculating $\int_c f(z) dz$ is an interesting technique. we use derivative, Laurent series, and sometimes Tylor series to calculate the integrals. Although the way is long and tough, we have to apply it because we have no other way around. [11]

For instance, we consider a circle C with $|z-2|=1$ and calculate the value of $\int \frac{dz}{z(z-2)^4}$

As we know here 0 and 2 are the isolated singular points of the function $f(z) = \frac{1}{z(z-2)^4}$ the functions have Laurent series at the neighborhood $0 < |z-2| < 2$, so we can write

$$\begin{aligned} \frac{1}{1-z} &= \sum_{n=0}^{\infty} z^n \quad (|z| < 1) \\ \Rightarrow \frac{1}{z(z-2)^4} &= \frac{1}{(z-2)^4} \cdot \frac{1}{z} = \frac{1}{(z-2)^4} \cdot \frac{1}{2+(z-2)} \\ &= \frac{1}{(z-2)^4} \cdot \frac{1}{2\left(1+\frac{(z-2)}{2}\right)} = \frac{1}{2(z-2)^4} \cdot \frac{1}{1-\left(-\frac{(z-2)}{2}\right)} \\ &= \frac{1}{2(z-2)^4} \cdot \sum_{n=0}^{\infty} \left[\frac{-(z-2)}{2}\right]^n = \frac{1}{2(z-2)^4} \cdot \sum_{n=0}^{\infty} (-1)^n \left[\frac{(z-2)}{2}\right]^n \\ &= \sum_{n=0}^{\infty} (-1)^n \frac{(z-2)^{n-4}}{2^{n+1}} \end{aligned}$$

Here for $n=3$, we have

$$\sum_{n=0}^{\infty} (-1)^n \frac{(z-2)^{n-4}}{2^{n+1}} = (-1)^3 \frac{(z-2)^{-1}}{2^4} = -\frac{1}{16(z-2)}$$

Therefore $b_1 = -\frac{1}{16}$ and by using the method of residue we have

$$\int \frac{dz}{z(z-2)^4} = 2\pi i b_1 = 2\pi i \left(\frac{-1}{16}\right) = \frac{-\pi i}{8}$$

III. CONCLUSION

By surveying and comparing the integral of real-valued functions and integral of complex-valued functions and also usage of derivatives theorems in integration we can state the results as below:

1. In general, the methods and techniques, which are used in the integration of real-valued functions are not applicable in complex integrations.
2. Complex integrations depend on techniques and theorem that help one to calculate the integral, and there is no special technique, which is directly applicable.
3. The derivatives of complex functions are not useful for integration as much as the derivatives of real-valued functions are.
4. Without some exceptional conditions, we have no physical or geometrical explanation to describe complex integrations.
5. The first and foremost method of complex integrations is residue, and mathematicians need to work hard on residue and expand it.

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Breastfeeding Mothers' Knowledge on Ten Steps to Successful Breastfeeding in Kapsabet County Hospital, Nandi County, Kenya

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Abstract: Breastfeeding leads to both short and long-term benefits of a child. It helps reduce infections and mortality among infants, improves mental and motor development, and protects against obesity and metabolic diseases later in the life course. The ten steps are maternity proven practices which help in achieving exclusive breastfeeding which remains a challenge not only to the unemployed mothers but also to the working health care professional hence why this study was carried out with an objective of assessing the knowledge, practices and barriers to exclusive breastfeeding among caregivers/mothers in Nandi County. The core methodological approach involved cross sectional research design through incorporation of both quantitative and qualitative approaches among 184 randomly selected mothers with infants less than 6 months old. Data was collected using researcher-administered questionnaires and a focus group discussion guide. Six focus group discussions were held at the end of the study with both caregivers and mother practicing and those not practicing exclusive breast feeding. Data analysis was done using statistical package for social sciences (SPSS) software version 22. The rate of continuous exclusive breastfeeding after birth was 86 (46.7%) of the children while for those not exclusively breastfed were 148 (80.4%). Maternal knowledge aspects included; mothers' knowledge on when to start breastfeeding after birth which was at 90.2% as well as when introduction of pre-lacteal feeds (48.4%) within two weeks, (46.7%) within one week and (4.9%) in three weeks started. There is need to improve on strategies and capacity building of mothers with limited knowledge on the benefits plus the required duration of exercising the ten steps of breastfeeding.

Key Words: *Mothers, Knowledge, Ten Steps, Successful, Breastfeeding*

1.0 Introduction

Ten steps to successful breastfeeding has been pointed out as one of the most effective preventive health measures to globally reduce child mortality and morbidity (Bartick & Reinhold, 2010). However, there are a number of inequalities in breastfeeding outcomes by socio-economic indicators and by race and ethnicity (WHO, 2012). Low wealth populations in developed and developing nations, as a group, exhibits lower breastfeeding rates, and thus are vulnerable to higher incidences of breastfeeding preventable illnesses.

Kenyan lactating mothers breastfeeding practices extensively differ with the recommended practices. For instance, according to Kenyan Demographic Health Survey, only 32% of the under 6 months children are breastfed yearly, albeit the fact that 97% of Kenyan children are breastfed at some point (African Population and Health Research, 2010). United Nations (2010) found out that, in order to meet the Millennium Development Goals of halving the prevalence of underweight children by 2015, mothers must comply with

the recommended breastfeeding practices. Therefore, the Kenyan government has been promoting the Ten Steps to successful breastfeeding in different regions in Kenya.

These ten steps to exclusive breast feeding by UNICEF (2013) include: having a written breast feeding policy that is routinely communicated to all health care staff, training health care staffs in the skills necessary to implement breast feeding policies, informing pregnant women concerning the management and benefits of breast feeding, assistance of mothers in the initiation of breast feeding within an hour, demonstration to mothers on how to breast feed and maintenance of lactation even if they are separated from their infants, giving infants no food apart from breast milk, allowing mothers to stay with their infants for 24 hours in a day, Encouraging breast feeding on demand, not giving infants artificial nipples and fostering the establishment of breast feeding support groups. When these practices are implemented by hospitals, they have been shown to have direct impact on breastfeeding initiation, duration and exclusive rates (Entwistle, Kendall & Mead, 2010). At initiation, statistics have shown that 98% of Kenyan breastfeeding mothers breastfeed their children.

However, this figure drastically falls to 34% at 3-4 months and ultimately to 32% of the caregivers who exclusively breastfeed to 6 months. This happens despite the fact that the Kenyan government has implemented the Ten Steps to Successful breastfeeding. Research by Britton, McCormick, Renfrew, Wade and King (2007) has shown that supporting the quality of hospital based breastfeeding support services and increasing the number of the Ten Steps practices in place will result in an increased number of women achieving their breastfeeding goals. Thus, this study will explore the knowledge, attitude and practices of care givers on the attainment of this program in Nandi County.

The overall purpose of the Ten Steps to Successful breastfeeding is to increase breastfeeding rates by helping women to achieve their breastfeeding intentions. On average, almost half of all infants 3 months of age are being exclusively breastfed in Kapsabet County Referral (UNICEF, 2013). However, by the time the infants are 6 months old, less than 25% are exclusively breastfed. This put the lives of these infants at risk of morbidity and mortality from breastfeeding preventable illnesses such as recurrent diarrhea. Mothers in Nandi County who do not exclusively breastfeed to six months use formulas which have serious short and long term consequences. Thus, the infants are at risk of many health problems including gastro intestinal illnesses, respiratory syncytial virus, bacterial meningitis and frequent hospitalization (Nickel, Labbok, Hudgens& Daniels, 2013; Labbok, Taylor, & Nickel 2013). In their childhood and adult life, they are more likely to have ulcerative colitis, higher blood pressure, rheumatoid arthritis and diabetes type 1 and 2. Besides, mothers in Nandi County who do not breastfeed are equally at risk of obesity, type 2 diabetes, osteoporosis and anemia. However, there are still higher risks of protein energy malnutrition in Nandi county and higher child mortality rates in the region.

2.0 Literature Review

Strategies to improve infant and young child feeding (IYCF) are a key component of the child survival and development programs of many nations, supported by UNICEF and the World Health Organization (WHO). They include infant and young child feeding (IYCF) as priorities (WHO, 2006 & Dorea, 2009). Although infants experience variations in how they are cared for, some care giving practices that have been shown to be beneficial for the infant as well as the caregiver. According to Labbok (2001) care giving practices such as breastfeeding and maintaining close physical contact support an infant's health and development (Picciano, 2001).

The decline in the practice of breastfeeding, which started in developed countries like the U.S., has been observed in developing countries as well (Xai, 2012). This decrease in breastfeeding rates around the world has led to serious implications for infant health in developing countries, including infants in the Caribbean (Amador et al., 1994). The decline in exclusive breastfeeding (EBF) has led to an increase in the prevalence of protein energy malnutrition (PEM) in Caribbean, African and Asian countries. Studies have shown that although high initiation rates of breastfeeding in the Caribbean exist, the prevalence and duration of EBF is very low (Scarlett et al., 1996).

Qualitative assessments of Caribbean mother's perceptions, attitudes, and values attached to food items show that infant and child feeding practices vary considerably and that a mother's attitudes toward breastfeeding are strongly influenced by her female role models, including mother, mother-in-law, and grandmother (Chambers et al., 2007). Because the decision to breastfeed is often made long before a woman becomes pregnant, breastfeeding promotion programs should focus on educating women during their preconception years. Caregivers worldwide adopt diverse infant feeding practices; including mixed feeding, replacement feeding, exclusive breastfeeding as well as pre lacteal feeding and complementary feeding. According to Tanzania National Bureau of Statistics (2010) exclusive breastfeeding and pre-lacteal feeding after birth is still common in some cultures but this changes because as the infant grows exclusive breastfeeding becomes uncommon or is rarely practiced.

Efforts to improve the implementation of the ten steps of breastfeeding rates have been directed at stages of a woman's reproductive experience, especially, during the preconception and prenatal periods, within 24 hours of delivery, and throughout the postpartum period in the hospital and at home (Mannion, Hobbs, McDonald & Tough, 2013). Since 1991 the Baby Friendly Hospital initiative has been implemented in many hospitals and recommend; reduced use of infant formula; nurse assisted initiation of breastfeeding immediately after delivery and referrals to outside breastfeeding resources upon discharge (UNICEF, 2013). However, none of these efforts seem to increase the duration of breastfeeding. Breastfeeding duration is variable and falls below the recommended United Nations Children Education Funds and World Health

Organizations recommendation of exclusive breastfeeding (Mannion et al., 2013). The recommended exclusive breastfeeding duration is from zero to six months. During which time there should be no artificial milk substitutes or other fluids. Thus, to ensure successful exclusive breastfeeding as recommended, ten steps to successful breastfeeding as been pointed out as the best strategy.

According to the UNICEF (2009) the ten steps of practices of breastfeeding to infants less than six months old has increased in all except in the developing region. The developing world has seen a progress from 33% around 1995 to 37% around 2008 which is a relative increase of about 16% (UNICEF, 2011c and UNICEF, 2009a) and currently stands at 36% (UNICEF, 2011a). South Asia, East Asia / Pacific and Eastern / Southern Africa are regions with the highest levels of exclusive breast feeding (44%, 43% and 39%) (UNICEF, 2009e and UNICEF, 2011a). The rates of practicing ten steps to successful breastfeeding are particularly low in West and Central Africa (23%), East Asia and Pacific (28%), Central and Eastern Europe/Common wealth of Independent States (CEE/CIS) with 29% (UNICEF, 2011b). According to Xu et al., (2009) breast feeding in China since mid-1990s in most of the cities has increased to above 80% at the age of four months but this is challenged as very few caregivers manage to reach the national exclusive breastfeeding target of above 80% for six months. Findings of an infant feeding survey in the UK showed that breastfeeding initiation rates were high at 76%, and at one week 45% were still exclusively breastfeeding but at six months this dropped to less than 1% (Scientific Advisory Committee on Nutrition, 2008).

Breastfeeding initiation is universal with 99% of children below six months of age being breastfed with a long duration as 53.6% of children 20-23 months old still breastfeeding (KNBS and ICF Macro, 2010). Breastfeeding has increased from 13% in 2003 to 32% of children below six months being exclusively breastfed while the prevalence rate after six to eight months has been 3.6% (KNBS and ICF Macro, 2010) from 3.2% in 2003. despite the intervention of the Kenyan government, the prevalence has yet to reach the WHO goal of 90% and this value is still below the global prevalence of 37%. in the east African region exclusive breastfeeding is still the lowest at a prevalence of 47% (UNICEF, 2011).

Studies across the world have revealed benefits of breastfeeding both for the mother and the infant. According to a study by Mirshahiet al., (2008) in Chittagong, Bangladesh, infants who were exclusively breastfed from 0-6months had lower prevalence of diarrhea and respiratory infections as opposed to those who were not exclusively breastfed. Breastfeeding children under the age of two years can potentially reduce or prevent about 1.4 million deaths in the developing world (Black et al., 2008). WHO (2013) suggests that exclusive breast feeding is a desired mode of food provision to developing infants. WHO (2013) and UNICEF (2013) recommend some measures that mothers should put in place for them to sustain exclusive breast feeding which include the need to initiate breast feeding within an hour immediately after

birth. Besides, the mother has to give the child only breast milk without the addition of any drink or food. The mothers should also breast feed on demand. Finally, the teats, pacifiers and bottles should not be used (Cai, 2013).

Dorea (2009) observe that Breast milk has several advantages. To start with, it is natural food that is available to the babies. Breast milk also has all the required nutrients needed by an infant. Thus, feeding the baby exclusively from such milk ensures that a child keeps malnutrition and hunger a bay (Drane and Logemann, 2000). Exclusive breast feeding has also been shown to reduce infant mortality that could arise because of illnesses in the childhood such as pneumonia and diarrhea. To the mother, breast feeding is an ideal mode of family planning. This is because it helps in spacing of children. Other benefits that are accrued from exclusive breastfeeding include protection of the mother against cancer of the ovary and the breast and increment in both national and family resources (Mortensen et al., 2002). Breast feeding infants also helps them respond to respond well towards vaccination and also enables them to develop cognitively.

3.0 Methodology

The study used a cross sectional survey which employed both qualitative and quantitative methods in data collection as per the recommendations of Katzenellenbogen *et al.*, (2002). In this type of study design, either the entire population or a subset thereof is selected, and from these individuals, data are collected to help answer research questions of interest. It is called cross-sectional because the information which is gathered represents what is going on at only one point in time The study aimed at collecting information from respondents on care givers knowledge on the Ten Steps to successful breastfeeding, the attitude of the lactating mothers on the Ten Steps to successful breastfeeding and the practices of the care givers on the Ten Steps to successful breastfeeding. Additionally, the knowledge of the MCH clinic nurse on the Ten Steps to successful breastfeeding was also explored.

The study targeted mothers with their infants 0<6 months old residing within Nandi county by accessing post-natal care at Kapsabet county hospital. A target population of 195 mothers was used but only 184 mothers responded during the study. All breastfeeding mothers visiting the MCH clinic at Kapsabet County Referral Hospital were invited to participate in filling the questionnaires. Systematic sampling was used to select the subjects since it provides equal chance of inclusion, minimizes bias and has great potential to provide good representation.

The sample size was calculated using a formula by Cochran (Israel, 1992); This was adopted because the study only assumes the finite nature of the population and to be more confident that the study meets the required sample size based on the formulation, the acceptable sample size ranged between a minimum ration of parameter to 10 observations.

$$n = \frac{z^2 p(100-p)}{\varepsilon^2} \text{ where}$$

n = the required minimum sample size

p = estimated prevalence of mothers who breastfeed exclusively up to 6 months of infants age (which is 13% as per study by KNBS and ICF Macro, 2010))

ε = margin of error on p (set at 5)

q = 1-p

z = standard normal deviate corresponding to 95% confidence level (=1.96)

By substituting the above equation, it gave 192 respondents

A questionnaire with both closed and open-ended questions was used to collect both the quantitative and qualitative information on breastfeeding mothers' knowledge on ten steps to successful breastfeeding. The questionnaire was adopted from a face-validated one used in a study in a low-resource urban setting by Ochola (2008) and modified for this study. In addition, a focus group discussion (FGD) guide was used to elicit information on infant feeding practices from the breastfeeding mothers. In order to pre-test the questionnaire on the length, content, question wording, and language, eight respondents (5% of the total sample) from Nandi attending PNC were interviewed. This was necessary to facilitate modifications on the questionnaire by correcting mistakes. This also ensured that the researchers conducted the interviews in a standardized way.

Additionally, questionnaires were revised by team leaders and the recommended modifications to specific items were done to suit the study objectives. Ensuring that the questionnaire content represented the study objectives enhanced content validity. Questionnaires were also pretested in Moi Teaching and Referral Hospital before actual data collection began. Finally, during data collection the questions were paraphrased and repeated severally so as to ascertain whether the respondents had comprehended the questions.

The collected data was checked, coded, cleaned and entered into SPSS software for analysis. All the analysis of quantitative data was done using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics such as frequencies, percentages, means, standard deviation and median were used to describe maternal knowledge, sources of breastfeeding information and maternal delivery history. Frequencies and percentages were used to describe the infant's and maternal age since the data was not normally distributed. In reporting exclusive breastfeeding rate, infant age is disaggregated as 0, 1, 2, 3, and 4 and 5 months as recommended by WHO (2008) on indicators of infant and young child feeding.

Data from focus group discussions was transcribed, responses arranged in general categories identified in the discussion guide then coded. Common themes were identified, inferences made from each theme and conclusion drawn then triangulated with the data from the questionnaire.

Clearance to obtain a research permit for the study was sought from Kisi university graduate school. Research permit was also obtained from National Council for Science, Technology and Innovations and the Management of Kapsabet County referral Hospital to conduct the study. Informed consent was obtained from the mothers before conducting the research. The information obtained from the study participants was handled with utmost confidentiality.

4.0 Results

Education Level

The breastfeeding mothers were asked to indicate their education level in the questionnaire. The results are presented in Table 1.

Education Level	Frequency	Percentages
Primary education	61	33.2
Secondary Education	57	31.0
No Formal Education	51	27.7
Post secondary Education	15	8.1
Total	184	100.0

The study found out that 33.2% of the breastfeeding mothers had primary school level of education, 31.0% had secondary school level of education and 27.7% respondents had no formal education while 8.1% of the respondents had post-secondary level of education. The evidence of the association between a mother's level of education and the duration of breastfeeding also varies (Ballard, 2009). In this study, lower than secondary level education was associated with earlier cessation of breastfeeding. While it is not very clear why this is the case, higher education may be associated with higher knowledge and practice of positive health behavior.

Breastfeeding Practices

In addition, the respondents were asked to their breastfeeding practices, it emerged that almost all the children (99%) were ever breastfed; however, more than a third (37%) were not breastfed in the first hour following delivery. The main reasons given for not initiating breastfeeding immediately as per the FGD reports were: little or no breast milk (35%); baby being asleep/tired (23%); baby being sick (13%); and mother being sick (19%). Two in five of the children were given something to drink other than the mothers' breast milk within 3 days following delivery. The main reasons given were that the mother had little or no breast milk (42%) or that the child had an upset stomach (32%) (Table 2).

Table 2 Breastfeeding Mothers Practices after Birth

Time for breastfeeding initiation after birth	Frequency	Percentage
Immediately after 1st hour	166	90.2
More than an hour	18	9.8
Provision of pre-lacteal feeds		
Within one week	86	46.7
After two weeks	89	48.4
After 3 weeks	9	4.9

Table 2 presents information on infant feeding practices since birth. All the mothers in the study breastfed their infants after birth and the rate of timely initiation of breastfeeding (within 1 hour of birth) was 90.2%. This rate is slightly higher than that (58.1%) reported by the Kenya demographic and health survey of 2008-09 and that reported by Ochola (2008), of 30.2% for the mothers from the control group, 43.1% for the mothers from facility-based semi-intensive counseling group and 34.3% for mothers from home-based intensive counseling group in Kibera Kenya.

Sources of Knowledge and Contents of the Ten Steps of Breastfeeding

Majority of the respondents (mothers) (80.1%) reported to have received counseling on breastfeeding (Table 3). The main source of breastfeeding counseling was the health facility (ANC) for (74.2%) of the mothers. The rest (12.6%) received breastfeeding information from family / friends / relatives, (7.3%) from media and (5.3%) from other sources such as the church. In a study carried out by Webb-Girard *et al* in Nakuru, Kenya, 64% of women reported to have received infant feeding counseling (Webb-Girard *et al.*, 2010). Health care providers play an important role in breastfeeding practices by counseling during the antenatal and postnatal visits.

Table 3. Information Knowledge of Breastfeeding Mothers

Source	Frequency	Percentages
Mothers	140	74.2
Relatives	35	12.6
Media	9	5.3

Findings from the FGDs revealed that most of the mothers were not satisfied with the content of breastfeeding counseling offered at the public health facility that most of them visited. It may be important to educate other stakeholders on IYCF a perception that was echoed by respondents in FGDs where most felt that breastfeeding counseling should be brought to the community level and should involve the fathers, grandmothers, employers and the community at large. Similar sentiments were reported in a study by Ochola (2008) in Kibera Kenya. Additionally, it is notable that a high proportion of mothers get information

regarding infant feeding from relatives, friends and peers. This finding is similar to the findings of the FGDs during which the respondents reported that members of the community such as grandmothers and traditional birth attendants are important sources for breastfeeding information. This indicates that apart from the mothers, other members of the community may need to be included in breastfeeding promotion education so that they can pass on the right information to the mothers regarding infant and young child feeding.

Knowledge score was calculated for all mothers on issues of breastfeeding. The mothers who got the answer correctly scored 1 for each of the eight aspects that were asked while those who did not answer correctly scored 0. The mean knowledge score for all mothers was 5.46 (SD 1.4) with a minimum score of 2 and a maximum score of 8. Overall, the mothers had good knowledge on breastfeeding issues. An ANOVA test was done to determine the relationship between them. There was no significant difference in knowledge score among mothers < 25 years, 25-< 35 years and those who were 35 years and above (ANOVA, P= 0.137).

There was also no significant difference in knowledge score for mothers in different marital status (ANOVA, P=0.65) and mothers in different occupations (ANOVA, P=0.16). However, there was a significant difference in the knowledge score among mothers who had primary, secondary education, post-secondary education and those who had no formal education. (ANOVA, P=0.024). The mothers who had secondary school education had the highest score (6.14). This indicates that higher education level of the mother may facilitate better understanding of the ten steps of breastfeeding information. A significant difference was also observed in the knowledge score of mothers who practiced ten steps of breastfeeding and those who did not (ANOVA, P=0.01) for continuous following of the ten steps of successful breastfeeding since birth.

Table 4.7 Breastfeeding Mother’s Knowledge Score On Ten Steps Of Breastfeeding Information

Education level	N	Mean	Standard Deviation	ANOVA; p
Primary education	61	5.24a	1.33	
Secondary education	57	5.41a	1.66	
No formal education	51	5.62a,b	1.52	
Post-secondary education	15	5.83a,	1.09	0.024

Mothers’ Understanding of the Ten Steps of Breastfeeding Concept

Mothers in this group seemed to have a good understanding of the concept often steps of breastfeeding and stated that it meant giving the baby only breast milk without even water for six months. Some mothers reported that they had practiced exclusive breastfeeding with their older children.

The mothers gave the benefits of breastfeeding from their own understanding and also from what they had learnt from the hospital as follows: 'Mother's milk is more important to the baby than any other food as it contains all the nutrients that a baby needs for six months.' as said by one mother. Other benefits that the mothers gave were; breastfeeding helps the baby not to contract many diseases; breast milk is safer and hygienic and is always available; breastfeeding helps a mother not to get pregnant although not always; and that breast milk makes the baby to grow healthy and strong.

5.0 Conclusions and Recommendations

The study concluded that there was a significant difference in the knowledge score among mothers who had primary, secondary education, post-secondary education and those who had no formal education. It was therefore recommended that support group programmer be emphasized in the BFH1 projects, so that breastfeeding mothers have a better understanding and acceptance of intervention in improving the ten steps to successful breastfeeding.

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Cost Management and Financial Performance of Consumer Goods Companies, Quoted in Nigeria

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Abstract- Financial performance measured the life blood of economic units, the key to determine the perpetuity of a company as cost remain its major determinant. An increase in cost and sales price would attract low returns on sales and foster liquidation in most companies. Unfortunately, This affect the financial growth of the country but most company failed to comprehend the vitality of cost profile and it effect on profitability. This study examined the effect of Cost Management on financial performance of quoted Consumer goods firms in Nigeria

The population of the study was 27 consumer goods companies listed on the Nigeria Stock Exchange. A sample frame of 10 companies was selected for a period of 10 years (2009 – 2018). The study adopted a purposive sampling technique. Data were obtained from the audited financial statement, and the accounts have already validated by regulatory authorities. The study took descriptive and inferential statistics.

The result revealed joint insignificant effect of cost management on, Net profit margin ($R^2=0.0185$, $F(4, 96)=0.55$, $p\text{-value}=0.698$). Moreso, the predictors was measured with four indicators Cost of Sales, Selling and distributing cost, Administrative cost and Finance Cost, out of this four some effect dependent variable (financial performance)positively while some exerted negative effect.

The study concluded that the insignificant effect of cost management might be as a result of inconsistency dividend pay, inadequate cost information and inefficient cost control and ascertainment. Therefore, adequate management and quality cost ascertainment and control is highly recommended by this findings.

Index Terms- Cost management, Financial Performance, Return on capital employed, Net profit margin, production cost.

I. INTRODUCTION

Well run profit making organisations will survive in a dynamic business environment. The ultimate goal of every firm is profit maximization and cost minimization through proper cost management, in order to maximize shareholder wealth (Christian, 2019). An uneven development had been marked in the manufacturing world for the past decades. This had brought an unexpected daunt to the industry in the globe. The crippling economy had brought an adverse effect on financial capability of most manufacturing firms, to achieve a sustainable financial performance, profit maximizers are to be engaged. Most Companies in the household products industry had ceased in

operation and more prominent companies had merged with other manufacturing companies because of the high cost of production. (Oyedokun, Tomomewo & Owolabi , 2019)

Siyanbola and Raji (2013) posited that cost and profit in business determines its financial position. An increase in turnover expands production capacity (cost), this demand effective cost management. Innes, John, Mitchell and Sinclair (2000) discovered product/service cost, quality and performance managements as surviving triplet for any company today. Customers continuously demand for high quality products/services and better performance, at a low price. Likewise, shareholders demanding for high return on their investment. Nevertheless, cost has become the determinant to performance and the challenge is being able to manufacture products or provide services within the acceptable cost framework.

Costs become a very important part of the company; more of the most important cost components is production costs, promotion costs and distribution costs. Cost occurs as a result of the project steering core of its activities, such as the salaries of managers, accountants, phone costs and rent, sales costs that occur as a result of the sale of products such as sales transfer, storage, distribution costs, sales commissions, and production costs. The greater the cost the higher the price of the product but decrease in the rate of turnover will negatively affect the financial performance of the companies especially on consumable goods industry. (Husein, Khalifa, & Elkarim, 2016)

The financial strength of an organization are measured in monetary terms and the results are reflected in firm's profitability ratio such as return on capital employed (ROCE), Net profit margin (NPM) and Earnings per shares (EPS) et.c. Okegbe, Ofurum and Darlington (2019) opined that financial performance measures are the life blood of economic units, since without it no decision can be made. Financial performance is one of the important performance measures for economic units as return on capital employed (ROCE) measures the ratio of net operating profit of a company to its capital employed. It shows the profitability of a company by expressing its operating profit as a percentage of its capital employed. (Irfanullah 2019)

There is no doubt that company's need strong and competitive human resource to succeed and increase in their financial performance, Consumer Packaged Goods companies must get better at shifting resources away from unpromising areas and toward areas of strength with the highest growth potential. The success of a firms whether large, medium or small, depends on the quality and value of resources they have and effective cost-

reduction programs. (Henrich, Little, Martinez, Shah, & Sichel, 2019)

Cost management is the control of actual or forecasted costs incurred by a business. It allows business to predict impending expenditures and prevent over budget. Profit is the resultant of two varying factors, sales and cost. The wider the gap between these two factors, the larger is the profit. Thus, profit can be maximised either by increasing sales or by reducing costs as ascertained by the management. (The Institute of Cost Accountants of India, 2016). However, most consumable goods companies increases in turnover yet most merged, ceased to operate while some break up as a result of their low or poor financial performance. Most of the studies on cost management and performance concentrates more on corporate sectors, leaving consumer goods sector with limited research. Hence, this study investigates what seems to be an effect of cost management on the financial performance of quoted consumer goods firms in Nigeria, specific objectives of the study examine the effect of cost management on profitability ratio (ROCE, NPM, EPS) for a period of Ten years between 2009 to 2018.

Research Questions

1. what is the effect of cost management on return on capital employed in consumer goods companies quoted in Nigeria?
2. to what extent does cost management affect net profit margin in consumer goods companies quoted in Nigeria?
3. what is the effect of cost management on earning per share in consumer goods companies quoted in Nigeria?

Research Hypotheses

The following **null hypotheses** were tested in the study:

H₀1: there is no significant effect of cost management on return on capital employed of consumer goods companies quoted in Nigeria

H₀2: cost management does not significantly affect net profit margin of consumer goods companies quoted in Nigeria.

H₀3: cost management does not have any significant effect on earnings per share of consumer goods companies quoted in Nigeria.

This study would enhance the knowledge of the stakeholders, investors, managers on how to create profits and values, how to efficiently and effectively transform input into output. Also influence the management of consumer goods, on how to identify, measure, interpret, planning and present costs as they relate to the industries economic flow of goods and service. It will update students, researchers, the public and the workers through its feedback on past performance, and motivate for future performance.

II. LITERATURE REVIEW

Financial Performance

The financial framework is the old paradigm for performance evaluation. performance evaluation systems have seen two new profitability measures: percentage of gross profit and the rate of return on investment. However, several authors (e.g., Fouad & Abouelela, 2016; Morgan, 2012) indicated that

although financial measures are important, they are not enough for a good performance evaluation system.

However, Al-Zararee and Al-Azzawi (2014) indicated that there is a lack of evidence of when and how non-financial measures improve managerial performance. Firm performance can be looked at from different directions and perspectives. This study decided to focus on the financial aspect of performance. Financial performance itself can be viewed and assessed differently, including liquidity and turnover which measures the ability of firms to catch up with expected financial obligations that are due and this must be done without interruption of day to day operations of the business (Etale & Bingilar, 2016). Financial performance can also be seen from the eye of profitability. This dimension of financial performance deals with the extent to which a firm generates profit from the factors of production such as labour, management and capital (Pius, 2013; Olabisi, 2012). Some useful measures of financial performance are as follows;

2.1.2 Returns on Capital Employed (ROCE)

Return on Capital Employed (ROCE) is a measuring tool that measures the efficiency and profitability of capital investments undertaken by a corporation. Return on Capital Employed ratio also indicates whether the company is earning sufficient revenues and profits in order to make the best use of its capital assets. (Singh & Yadav, 2013) Return on Capital Employed is generally calculated on the basis of two major calculations/ components which are operating profit and capital employed. Operating Profit is the profit that a company earns from its business operations before the deduction of taxes and interests and it is also known as earnings before interest and taxes (EBIT). It is calculated by deducting operating expenses and cost of goods sold from revenues while capital employed is the total amount of capital invested in the business operations by the shareholders and other sources to earn a profit. It is also known as fund employed. (calculated as the total assets less current liabilities) (EduPristine, 2017)

Companies with low returns are always suspecting because they are in danger of becoming loss-making if trading conditions deteriorate. Companies with exceptionally high returns may invite competition for their products or services, unless they are fully protected by patents or in some other way. (Singh & Yadav, 2013).

Earnings per Shares (EPSs)

The EPS of an entity whose shares are publicly traded is regarded as a very important measure of performance. It is therefore important that EPS should be reported on a standard basis for all relevant companies. Even today, EPS is considered to be the single most popular, widely used financial performance benchmark of all. Graham, Harvey and Rajgopal (2004) surveyed 400 financial executives in the USA and reported that the majority, by far, were of the opinion that earnings were the most important performance measure they report to outsiders. EPS is also the linchpin undergirding strategic decision making like share valuations, management performance incentive schemes and merger and acquisition negotiations. The formula for calculating EPS is Retained Earnings divided by Total number of ordinary shares. EPS is simple to calculate and easily understood and management is congratulated when there is positive EPS growth. It is no surprise that managers take a special interest in EPS when

their compensation is linked to the EPS performance of the company.

Net Profit Margin (NPM)

There are four stages of profit or profit margins in an income statement - gross profit, operating profit, profit before tax and net profit. The objective of margin analysis is to find reliability or positive/negative movements in an organization's earnings. Management has good control over managing costs than its cost of sales. An organization's most important goal is to generate income and keep it, which is determined by assets and performance. Because these features figure out an organization's ability to pay dividend, earnings is demonstrated in stock price. Organizations with great income have a larger support to secure themselves during the difficulty.

Cost and Cost management

Cost management involved planning, estimating, budgeting, and controlling costs so that the budget can be completed within the approved period of time (Buchner, 2015).

One major issue that most organizations have to deal with regularly is that of cost. This arises as a result of the need to rightly value company assets and liabilities as well as products and services in order to maximize profit. Cost is regarded as an important factor in the operational processes of every organization for several reasons. Mohd, Muammar and Ainatul (2014) observed that cost is essential not only to fix price but also to ascertain the margin of profit. According to Xu and Zia (2012), cost accounting is the process of determining and accumulating the cost of product or activity. It is a process of accounting for the incurrence and the control of cost. Sheikh (2018) added that it also covers classification, analysis, and interpretation of cost. As an internal aspect of the organization, cost accounting is accounting for cost aimed at providing cost data, statement and reports for the purpose of managerial decision making (Mohd, et al., 2014).

Theoretical framework

Resource Based View Theory- This research work adopted Resource Based View theory.

This theory was propounded by Edith Penrose in 1959 on the growth of the firm. Pearce and Robinson (2011) defined the resource-based view (RBV) as a method of analyzing and identifying a firm's strategic advantages based on examining its distinct combination of assets, skills, capabilities and intangibles as an organization. This theory views the firm-specific factors and their effect on performance. (Grant, 1991) views the firm as a bundle of resources which are combined to create organizational capabilities with which it can earn above average profitability.

Application of the theory

Firm performance has been central in strategy research for decades and encompasses most other questions that have been raised in the field, as for instance, why firms differ in performance or profitability, how they behave in terms of returns, how they choose strategies and how they are managed (Porter, 1991). In the 1990s, with the rise of the resource-based approach, strategy researchers' focus regarding the sources of sustainable competitive advantage shifted from industry to firm specific effects. The choice of this theory is because it portrays more on

input performance relating to influence of resources, competitive environment,. Strategy, competitive advantage and their performances in an organization.

III. RESEARCH METHODS

This study employed ex-post facto research design using panel data analyses of financial information extracted from published financial statements and accounts of consumer goods companies listed on the Nigerian Stock Exchange for a period of Ten (10) years (2009 -2018). Ten (10) consumable companies was purposively sampled out of 27 listed consumer goods companies in Nigerian Stock Exchange (NSE).(table 1). The Institute of Chartered Accountants of Nigeria (ICAN) 2006 defined population as being made-up of specific conceivable traits, events, people, subjects or observation. The sample frame for this study comprises of the ten listed consumer goods companies under the consumer's good category of the Nigeria Stock exchange. These goods are for direct consumption by the consumer in their respective target market.

This findings employed both descriptive and inferential statistical analysis. The data collected through secondary sources were tabulated in table 1 and findings from the report were presented in other tables, analyzed using both descriptive and inferential statistics. Generalized least square Regression analysis statistical tools was adopted. The regression analysis was applied to the regression models to measure, explain, and predict the effect and linkage between the variables. These methods were used to test the hypotheses, solve research questions determine the effects of cost management proxy on profitability of the consumer goods companies. Variables for the study include the dependent variable (financial performance; Return on capital employed, Net profit margin, Earnings per share) and cost management (independent variable). The regression analysis revealed R² and F-stat. and z-test. R² to determine the extent at which changes in the level of cost management were explained by financial performance and F-statistic often used to compare statistical models that have been fit to a data set and determine the significant strength of the joint parameter. Further panel diagnostic test were carried out (Hausman test, Breusch and Pagan Lagrangian multiplier test, and Breusch-Pagan / Cook-Weisberg test) to ensure the suitability of the variable for regression.

Model Specification

In trying to achieve the objective of this study, a regression model was used to evaluate the impact of cost management on the financial performance of quoted consumer goods companies in Nigeria.

Y = f(X)

FP = f(CM)

Where: FP = Financial performance

CM = Cost management

Y = Financial performance (Dependent Variable)

And X = Cost management (Independent variable)

X = (COScm₁, SDCcm₂, ADCcm₃, FCcm₄)

Y = (ROCE_{fp1}, NPM_{fp2}, EPS_{fp3})

Functional Relationships

ROCE=f {COS,SDC,ADC,FC,}

.....1

$$NPM = f \{COS, SDC, ADC, FC, \}$$

.....2

$$EPS = f \{COS, SDC, ADC, FC, \}$$

.....3

The model is specified as:

$$ROCE_{it} = \alpha_1 + \beta_1 COS_{it} + \beta_2 SDC_{it} + \beta_3 ADC_{it} + \beta_4 FC_{it} + \mu_{it}$$

..... Model 1

$$EPS_{it} = \alpha_2 + \beta_1 COS_{it} + \beta_2 SDC_{it} + \beta_3 ADC_{it} + \beta_4 FC_{it} + \mu_{it}$$

..... Model 2

$$NPM_{it} = \alpha_3 + \beta_1 COS_{it} + \beta_2 SDC_{it} + \beta_3 ADC_{it} + \beta_4 FC_{it} + \mu_{it}$$

..... Model 3

Where:

$\alpha_1 - \alpha_3$ is the intercept for the models

$\beta_1 - \beta_3$ is the coefficients of the explanatory variables

μ is the error term of the proxies

i represents the 1- 10 firms

t represents the period of study(2009-2018)

COS- Cost of sales; SDC-Selling and distributing cost; ADC-Administrative and development cost ;FC-Finance cost; ROCE>Returns on capital employed; NPM-Net profit margin; EPS-Earning per share

Table 1 Lists of consumer goods Companies Listed on the Nigeria Stock Exchange

S/N	Consumer goods Companies	Activities
1	<i>P Z Cussons Nigeria Plc*</i>	Medicated Soap
2	<i>Unilever Nigeria Plc*</i>	Foam
3	<i>Vitafoam Nigeria*</i>	Foam
4	Nigerian Enamelware	Kitchen utensil
5	Nascon Allied Industries Plc	Food product
6	<i>Nigeria Flour Mills Plc*</i>	Flour
7	Multi- Trex Integrated Foods Plc	Food product
8	Mcnichols Plc	Food and beverages
9	<i>International Breweries Plc*</i>	Drinks
10	<i>Honeywell Flour Mill Plc*</i>	Flour
11	Golden Guinea Brew. Plc	Drinks
12	<i>Guinness Nig Plc*</i>	Drinks
13	<i>Cadbury Nigeria Plc*</i>	Beverages

14	Champion Brew. Plc	Drinks
15	Dangote Sugar Refinery Plc	Sugar
16	Dangote Flour Mills Plc	Flour
17	Dn Tyre & Rubber Plc	Rubber
18	<i>Flour Mills Nig Plc*</i>	Flour
19	<i>Nestle Nigeria Plc*</i>	Beverages
20	Union Dicon Salt Plc	Salt
21	Live stock feed plc	Feeds
22	Morison Industries	Food and drinks
23	Okomu oil palm industries	Palm oil
24	Presco plc	Agro product
25	National salt plc	Salt
26	FTN Cocoa processors plc	Beverage raw materials
27	Ellah lakes plc	Aquatic product

Source: The Nigerian Stock Exchange daily official list (2018)

Note: The selected companies were asterisk and italise ()**

IV. RESULT AND DISCUSSION

Table 2 indicates the descriptive analysis of each variable in this research. This study shows large dispersion between standard deviation 405.79101 and mean of ROCE 48.0107. Similarly, dispersion between standard deviation and the means of NPM (16.6655 and 53.45187) were high, compared to low dispersion between EPS (mean=5.1254 and standard deviation=9.733773. This establishes high volatility in ROCE and NPM while slim or low volatility exist in EPS.

However, much variation in the minimum and maximum values of ROCE, NPM, and EPS, of -3413.51,0.56, and 0.01, for their minimum values respectively, while their maximum values showed 1021.75, 527.65, and 54.26 respectively. This value implies that for the period under study, the cost management on performance measure of the sampled firms has not been stable. Relatively, slim dispersion exist between standard deviation and mean values of cost of sales (COS) and administrative and development cost compare to selling and distributing cost with high volatility within the period of study.

Table 2: Descriptive Statistics Result
Descriptive statistics result of the variable from 2009-2018

Variables	Obs	Mean	Standard deviation	Min	Max
ROCE	100	48.0107	405.79101	-3413.51	1021.75
NPM	100	16.6655	53.45187	0.56	527.65
EPS	100	5.1254	9.733773	.01	54.26
COS	100	67.0324	72.45696	1.1	337.82
SDC	100	32.6232	219.5528	0	2201
ADC	100	8.9149	13.26076	0	114.64
FC	100	4.3033	12.0545	0	112.73

Source: Researcher’s Computation, 2020

*Observations: 100

Positive minimum values of the cost management proxies implies that the firms did not decline in their cost management and the negative minimum value of ROCE (-3413) a proxy of financial performance showed that some firms had a low rate of performance during the accounting years review. The high rate of dispersion from the mean among the independent and dependent variables confirms a high rate of variations within the data set

4.2.1 Test of Hypotheses

Panel Diagnostic Test

The variables under study were subjected to the diagnostic test. Hausman test to determine whether we will run Random, Fixed, or Pooled. auto correlation, and heteroscedasticity test

4.2.1.1 Test of hypothesis One

Research Objective 1: evaluate the effect of cost management on return capital employed of consumer goods companies quoted in Nigeria.

Research Question 1: What is the effect of cost management on return on capital employed in consumer goods companies quoted in Nigeria?

Research Hypothesis 1 (H₀₁): There is no significant effect of cost management on return on capital employed of consumer goods companies quoted in Nigeria.

Table 3 shows the hausman specification test has its null hypothesis that the difference in coefficients of a model is not systematic and hence the random effect estimation technique is found most appropriate while fixed effect will not, for $p=0.3101 > 0.05$. The study went further to confirm the appropriateness of the random effect estimation technique by conducting the Breusch and Pagan Lagrangian multiplier test. This test has a null hypothesis that random effect is not needed and not appropriate for the model, the result showed that the study can accept the null hypothesis that random effect is not appropriate for this model, for $p=0.472 > 0.05$. Also, the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity was carried out to determine if the variance of the residual are constant. This test has a null hypothesis of constant variance of the residual, this report suggest that the study accepts the null hypothesis of constant variance $p=0.342 > 0.05$, indicating that the variance of the residual is not constant. In testing for autocorrelation in the panel data, the Wooldridge test was conducted. This test has a null hypothesis of no first-order autocorrelation and its result in this model showed a probability value of $0.0000 < 0.05$ and this suggest the presence of autocorrelation in the model.

Table 3 Regression Analysis for Model 1

Effect of Cost management on Return on Capital employed				
R squared	0.060	Hausma specification test	4.78 (0.3101)	
Wald chiq²	0.52	Breusch and Pagan Lagrangian multiplier test for random effects	0.01 (0.472)	
Prob.	0.9914	Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	0.90 (0.342)	
		Wooldridge test for autocorrelation in panel data	94.9 (0.000)*	
Variable	Coefficient	Std Error	z	z –Probability
Cost of sales (COS)	0.2404528	0.6446979	0.37	0.709
Selling and distributing cost(SDC)	-0.0086465	0.1885128	-0.05	0.963
Administration cost (ADC)	1.617181	3.305566	0.49	0.625
Finance Cost (FC)	-0.8578896	3.539889	0.24	0.809
Cons	22.3123	63.87522	0.35	0.727

Source: Researcher’s Study, 2020

dependent variable: ROCE

$$ROCE_{it} = \alpha_1 + \beta_1 COS_{it} + \beta_2 SDC_{it} + \beta_3 ADC_{it} + \beta_4 FC_{it} + \mu$$

..... Model 1

$$ROCE = 22.31 + 0.24045 - 0.008646 + 1.6171 - 0.8578896 + \mu$$

ROCE by 0.0857 to promote positive influence on returns on capital employed.

Test of hypotheiss Two

Research objective 2: determine the effect of cost management on net profit before margin of consumer goods companies quoted in Nigeria

Research Question 2: To what extent does cost management affect net profit margin in consumer goods companies quoted in Nigeria?

Research Hypothesis H02: Cost management does not significantly affect net profit margin of consumer goods companies quoted in Nigeria.

Hypothesis one tested the effect of Cost management (COS, SDC, ADC, and FC) on financial performance (ROCE) on the selected ten consumer goods companies. The result of the regression analysis on Table 3 shows that cost managements measured by four indicators out of the variable two FC and SDC (-0.85788. and -0.00864 respectively have negative effect (which shows that 1% reduction in FC will increase ROCE by 0.857 and 1% reduction in SDC will increase ROCE by 0.00864) while COS and ADC (0.2404 and 1.6171) have positive effect on return on capital employed (ROCE). (which shows that 1% increase in COS and ADC will reduce ROCE by 0.024 and 1.6171 respectively.

The R²=0.060 explains that only 6% of the total variation is explained by the independent variable while the balance of 94% is explained by factors outside this study.

At a level of significance 0.05, the Wald statistics is 0.52, while the p-value is 0.9914 greater than 0.05 adopted level of significance. This implies that non of the independent proxies was significant to effect returns on capital employed. The statistical insignificance of this model indicates that the study will not reject the Null Hypothesis which says that there is no significant effect of cost management proxies on returns on capital employed, hence the study will not accept the alternate hypothesis.

However, the positive effect of cost management proxies on ROCE may be as a result of ineffectiveness of cost management. This result is partially consistent with the study led by Oyerogba et al (2014) who found that the independent variables (cost management) ; Direct materials, Direct labour, Production overhead and Administrative overhead are positively significant in explaining capital employed as the performance of manufacturing organizations and conversely, with the findings of Famil, Ali and Yunus (2017) who shows a significant and negative relationship between ROCE and cost or Price-to-Earnings (PE) ratio. Therefore this study suggested an efficient cost management on finance cost as 1% reduction boost up

Table 4 indicates the diagnostic test carried out to determine the choice and appropriateness of the estimation technique employed. The hausman specification test has its null hypothesis that the difference in coefficients of a model is not systematic and hence the random effect estimation technique is not found appropriate while fixed effect is found appropriate for this study, for p=0.0014< 0.05. The study thus went further to test the appropriateness of the random effect estimation technique by conducting the Breusch and Pagan Lagrangian multiplier test. This test has a null hypothesis that random effect is not needed and not appropriate for the model, the result showed that the study can accept the null hypothesis that random effect is not appropriate for this model, for p=1.000>0.05. Also, the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity was carried out to determine if the variance of the residual are constant. This test has a null hypothesis of constant variance of the residual, this report suggest that the study reject the null hypothesis of constant variance p=0.000<0.05, indicating that the variance of the residual is constant. In testing for autocorrelation in the panel data, the Wooldridge test was conducted. This test has a null hypothesis of no first-order autocorrelation and its result in this model showed a probability value of 0.0000<0.05 and this suggest the presence of autocorrelation in the model.

Table: 4. Regression Analysis for Model Two

Regression analysis on cost management and financial performance (NPM)				
R squared	0.0227	Hausman specification test	17.75(0.0014)	
Adj. R squared	-0.0185	Breusch and Pagan Lagrangian multiplier test for random effects	0.00(1.00)	
F (4, 95) statistics	-0.55	Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	44.05(0.000)*	
Prob.(F statistics)	0.6986	Wooldridge test for autocorrelation in panel data	313322(0.000)*	
Variable	Coefficient	Std Error	t	Probability
COS	-0.914265	0.79656	-1.15	0.254
SDC	0.0017005	0.0247188	0.07	0.945
ADC	-0.2473144	0.4240655	-0.58	0.561
FC	0.0500912	0.4623934	0.11	0.914
Cons	24.72779	7.860546	3.15	0.002

Source: Researcher's Study, 2020 Dependent Variable: NPM; Obs: 100 p<0.05

$$NPM_{it} = \alpha_3 + \beta_1 COS_{it} + \beta_2 SDC_{it} + \beta_3 ADC_{it} + \beta_4 FC_{it} + \mu$$

..... Model 2

$$NPM = 24.727 - 0.914265 + 0.0017005 - 0.2473144 + 0.0500912\mu$$

Hypothesis three tested the effect of Cost management (COS, SDC, ADC, and FC) on Earnings per share (EPS). The result from table 5 shows that cost managements measured by four indicators out of the variable two COS and SDC (0.0332511 and 0.0001514 respectively have a positive effect (which shows that 1% increase in COS will increase EPS by 0.033 and 1% increase in SDC will increase EPS by 0.000151) while ADC and FC (-0.0136 and -0.0444) have negative effect on Net Profit Earning per shares (EPS). (which shows that 1% reduction in ADC and FC will increase EPS by 0.0136 and 0.044 respectively .

The $R^2 = 0.0254$ explains that only 2.5% of the total variation is explained by the independent variable while the balance of 94% is explained by factors outside this study the other 97.5% explained by factors outside the study

At a level of significance 0.05, the Wald statistics is 3.19, while the p-value of the Wald prob. is 0.5266 which is greater than 0.05 adopted level of significance. This implies that non of this proxies COGS, SDC, ADC, and FC had significant effect on Earnings per Share. The statistical insignificance of this model indicates that the study will not reject the Null Hypothesis which says that there is no significant effect of cost management on earning per share, hence the study will not accept the alternate hypothesis.

This study discovered a positive effect of cost management proxies on Earning Per Share but insignificant on decisions made by managers. This implies the importance of stakeholders in decision making as most shareholders, investors depends more on their returns from investment which is the product of cost as show in this findings that 1% reduction in finance cost would increase earnings per share by 4.4%. This result corroborate with the study led by Etale and Bingilar (2016) who found a positive effect between the price and the value of shares in the Nigeria manufacturing sector. It indicates the importance and necessity of shareholders' concentration on the cost value of shares before investing. More so, partially supported by Taani and Banykhaled (2011) who reviewed correlation between stock return and financial ratios. It discussed correlation using price to book value, cash flow from operating activities, and company size, each of them has significant correlation with stock (return earnings per share).

V. CONCLUSION AND RECOMMENDATION

This study examined cost management as a key for profitability in selected consumer goods companies in Nigeria. Three models were developed and all the model showed a positive effect of cost management on companies financial performance of consumer goods companies between 2009-2018. This result shows positive and negative effect of cost management proxies on Return on capital employed, Net profit margin and Earnings per share but were not significant, in the same vein no joint significant effect was established between cost management and financial performance (Net profit margin). The insignificant of COGS, SDC, ADC, and FC in this study might be as a result of inconsistency dividend pay, inadequate cost information, inefficient cost ascertainment and cost control in consumer goods companies.

Based on the result obtained from studying the effect of cost management on financial performance the following recommendations were made:

1. In order to maintain better performance of the firm and avoid negative minimum value as showed in table 2, managers and policing makers should consider cost ascertainment, control and information while trying to prioritize the growth and expansion of a business.
2. Consistent pay of dividend is paramount as most investors find it difficult to cope when is not forth coming, they tend to lose interest and sell off their investments. This could in turn have an adverse effect on the value of the firm.
3. This study revealed the positive and negative effect of each proxy of cost management thereby giving managers an insight on the factors that should be prioritized over others in order to increase profitability and ability to pay dividends

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How Brands in India connected with the audience amid Covid-19

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Abstract- The companies spent a huge amount in promoting their products to the public. Even at the times when the market came to a standstill owing to nation-wide lockdown to fight with Coronavirus, the companies continued to promote their products amid Covid-19. Some companies continued with their old advertisements while others made changes in their advertisement to include the coronavirus aspect in their promotion. In this paper, we have analysed the way the companies have responded in their promotion to fight with this unknown virus either by way of sending messages, creating awareness or the way their product would help people in fighting with this virus. We have taken into consideration the television advertisement and the promotion and hashtags used on their Instagram page. The companies selected are either Indian companies or companies whose products are available in India.

Index Terms- brands, advertisement, hashtags, coronavirus, covid-19.

I. INTRODUCTION

Covid-19 has become a pandemic that has affected the entire world. There was not much knowledge and information about this virus before December 2019. It was only after the virus that was first detected in Wuhan, China in 2019 that all the nations came into action to fight with this unknown virus. Coronaviruses cause illness in animals and humans. It causes respiratory infections in humans ranging from common cold to more severe outcomes. This virus can spread through droplets from the nose or mouth which are expelled when a person carrying the virus sneezes, cough or speaks. And that is the reason that the virus travels and spreads very fast. There were a total of 13,824,739 confirmed cases worldwide and 1,038,716 cases in India as per the WHO data as on 18th July, 2020. India was under lockdown since 25th March, 2020 and this lockdown continued till 30th May, 2020. The government eased most of the restrictions of lockdown and rolled out 'Unlock 1.0' from 1st June, 2020. There were still restrictions on shopping malls, movie halls etc.

As pointed out by Singh & Singh (2020)

There is a big shift in the world economic market and the share market has witnessed crashes day by day. Factories, Restaurants, Pubs, Markets, Flights, Super Markets, Malls, Universities and Colleges etc. were shut down. Fear of corona virus has limited the movement of the individuals. People were not

even going to buy the daily essentials and these all were somewhere impacting the economy of the world as a whole. (p.170-171)

Social media is a very powerful tool in the hands of marketers. Social media is considered to be a more trustworthy source as compared to the traditional sources of promotion like television advertisements (Foux, 2006).

II. THE ADVERTISING INDUSTRY

The malls, the market places and shops selling non-essential products were prohibited to operate during lockdown. The companies and retailers especially the small retailers and businesses were the worst hit during this time. Most of the companies despite the loss in sale continued to promote their products. The impact of coronavirus was also seen on television advertisements. As per the report published in Financial express, as per industry estimates, the expected decline in expenditure on television expenditure would be somewhere between 50-55% or Rs 3,750 Crore- 4,125 Crores between April 2020-June 2020 (Mahendra,2020). According to another data released by TAM AdEX as mentioned in the online issue BrandEquity.com from The Economics Times, the advertisement that revolves around the coronavirus has increased and there were around 41,000 minutes advertisement between 22nd March, 2020-28th March,2020 (Malvania,2020). There has been a decrease in commercial advertisement and a huge increase in social advertisement.

III. HOW THE BRANDS IN INDIA RESPONDED TO COVID-19 IN THEIR TELEVISION ADVERTISEMENT.

Though there had been a decrease in the television advertisement owing to Covid-19, there were brands who took this opportunity to stay connected with customers during this tough time. The television advertisements in India were viewed in order to analyse the response of brands to coronavirus and what changes they had made in their advertisements or taglines. One of the advertisements by Dettol Soap where they asked the public to wash their hands with any soap to protect from germs was very apt at this time. They not only promoted their product but also conveyed the message as to why washing hands is important to protect ourselves. They also spread this message through their advertisement to promote Dettol Handwash. Dettol also came up with a new advertisement featuring famous celebrities who

prepared their part of advertisement from their place following the lockdown guidelines. The celebrities were seen washing their hands and spreading the message to wash hands for 20 seconds. Another popular soap brand, Lifebuoy added the term “virus fighter” with their brand name and urged people to defeat the virus. The brand Savlon also came up with an advertisement to create awareness about Coronavirus. Yet another brand Lux, which is popular for beauty soap came up with a short advertisement where the Lux soap was also being used for washing hands and it changed its tagline to “Stay Protected, Stay Beautiful”. It did not mention the virus directly in the advertisement. Still the message to stay protected was sent across. Lux also continued with other advertisements without making any changes.

Lizol came up with the advertisement issued in public interest to educate the people about the importance of disinfecting the regularly touched surface at home to fight against coronavirus. They requested the public to disinfect using any disinfectant. Lizol did not promote their disinfectant in the advertisement except that at the end of advertisement the name of the brand was reflected. Even the disinfectant bottle that was used in the advertisement did not mention the brand name but one could make out from the shape and color of the bottle that the disinfectant is Lizol. They used celebrities like Kareena Kapoor and Saif Ali Khan for spreading this message.

Surf Excel is known for their heart-warming advertisements. They came up with advertisements where in a way they urged people to stay home. This advertisement was directed at children who have been stuck at home owing to the lockdown. It also had a positive message that all this will only be for a short period of time and then life will get back to normal. They also used the hashtag that the stains will stay at home since most of the people will be at home during the lockdown. This video was also uploaded on YouTube and had more than 55 lakhs views by June, 2020.

After some relaxation in the lockdown regulations, the popular Pizza brand, Domino's came up with an advertisement to spread a message about the contactless delivery that the brand is making. They also highlighted the rules that they follow to ensure safety measures. They came up with the tagline “Great Taste. Delivered Safe”. These kinds of advertisements play a very important role in winning the trust and confidence of the customers who fear placing orders due to safety concerns.

The mention of Coronavirus in advertisement was not only done by brands dealing in personal care products but also by brands like lenskart.com where people who broke their eyeglasses during lockdown were able to get glasses from lenskart.com. Another brand, India Gate, who deal with rice came up with a new advertisement with reference to covid-19 and lockdown. Horlicks also launched a new advertisement amid covid. Some brands were quick enough to make changes in their advertisement and came up with new advertisements with mention of coronavirus. While others continued with their already existing advertisement.

Use Of Instagram Hashtags to Stay Connected With Audience During Covid Times

Most of the brands have official pages on Instagram. For our study we visited the Instagram handle of Indian companies and analysed their posts after the coronavirus forced the nation to

lockdown. Most of the brands selected had verified Instagram handle. Only Dettol India did not have verified Instagram pages. Our study would only focus on the hashtags used by brands in their posts.

Savlon.India (112 posts, 6643 followers)

Savlon came up with #ChainOfProtection where people including celebrities from the film industry and their children were found using sanitizers to clean their hands. This chain of protection aims to break the chain of infection. They also highlighted the importance of social distancing with the quote that “Sometimes the only way to stand together is to stand apart”. Another popular hashtag used by Savlon was #GetActiveWithSavlon, where people were asked to create fun and engaging activities for children and also teach them the importance of hand hygiene. They also came with #SurakshaAapkeHaathMein meaning that protection is in your own hand again highlighting the importance of hand washing and sanitizing hands to fight with the virus.

Dettol.India (68 posts, 4903 followers)

Dettol used hashtags like #apnisurakshaapnehaath meaning that your protection is in your own hand. This was similar to the hashtag used by Savlon. They also came up with #handwashchallenge to encourage hand washing habits among the public and to make hand washing look cool.

Lizol India (50 posts, 712 followers)

With only 313 followers, Lizol India page became active post Covid-19. There was an increase in the number of followers and they also had verified Instagram handle. Their popular hashtag was #DisinfectToProtect where the importance of disinfecting was highlighted.

Parachute Advansed (184 posts, 5096 followers)

They came up with #BondOverAChampi where families were seen applying oils to help them de-stress and relax while they stay at home. Another hashtag that was used was #MoreStrenghtToYou which was dedicated to the multiple roles the women had to play owing to lockdown.

Harpic India (119 posts, 972 followers)

They continued its mission to save water by using hashtags #staysafe #savewater by conveying the importance of hygiene and washing hands but also encouraging them to save water while doing so.

Samsung India (3070 posts, 2.6M followers)

They have been very active on Instagram following the lockdown. They used hashtag #GetThroughThisTogether where they urged people to pre-book their orders from the comfort and safety of their homes and also gave some exciting offers so that customers place orders amid lockdown. They also came up with #MakeMemoriesAgain where the followers were asked to dig out their old picture with family, recreate it and also give a chance to get featured. This was very interesting and they got a really good response from the public. They also came up with online service appointments. As a mark of respect they also thanked health care workers on International Nurse Day. There was so much focus on

handwash that they came up with the Handwash App on Galaxy Smart Watch where the reminder for hand wash, wash time counter and daily hand wash trend tracker was built to track the hand wash habit of the user. They urged and thanked people again and again for staying at home. They also posted about their contribution to the PM Cares Fund. Mobile phones can be another source of passing the virus. They also taught people how the mobile phone can be sanitized. Another important initiative was that of extending the warranty for all the customers whose warranty was expiring between 20th March, 2020 and 30th March, 2020.

LG India (1153 posts, 50.9K followers)

The hashtag used by them was #StayHomeStayEntertained, #LGCaresForYou, #MultiTaskFromHome. They also asked their followers to stay inside their homes and follow the lockdown guidelines. They also extended the warranty period for the customers. Posting about the contribution to society was common for all. They contributed meals to the underprivileged during the lockdown. They extended their tagline “Life is Good” to tell people that life is good when you have more me time, more productivity, more family time and more relaxation. They also taught the importance of social distancing.

Ponds India (2545, 184K followers)

They used hashtag #LoseTheMakeupNotTheGlow since during the lockdown most of the women were at home and they did not go out for work, socializing etc. They also used hashtags such as #StayIn #StaySafe #SelfCare.

Suzuki Motorcycle India (1754 posts, 253K followers)

They were continuing with their original promotion posts till 3rd of April, 2020. On 4th April, 2020 they came up with a post where due to lockdown they extended the warranty expiring between 15th March, 2020 and 30th April, 2020 to 30th June, 2020. They used hashtags #Stayhome #Stay safe which was used by most of the companies. They also came up with #ARideToRemember where the followers were asked to share their throwback stories from the road. They also gave maintenance tips for two wheelers to their customers. They also used #StayInStaySafe. They also replaced different hand movements while riding bikes with safety measures that need to be taken. In one of the posts a person was seen opening the dustbin it was mentioned on the image that “Pressing the brake pedal be like”. In another post the twist in the wrist was shown as wringing the clothes. Suzuki Motorcycle became very active on Instagram during Covid time.

Hero MotoCorp (1507 posts, 108K followers)

They extended the warranty period till 30th June, 2020. They gave tips to store bikes when not in use. They used hashtags like #Stayhomestaysafe. They also posted about their contribution to society in the form of distribution of masks and hand sanitizers which were produced in their manufacturing plants. They requested people to stay indoors and said that staying indoor was the most heroic thing that they can do.

Toyota India (701 posts, 224K followers)

They have been active on Instagram since this lockdown was introduced. Their first post came on 21st March, 2020 ahead of one day lockdown in India on 22nd March, 2020. They used hashtag #ToyotaWithIndia signifying that the company is with India during its fight with Covid. They urged people not to go out and stay back at home as safety can't take a backseat and it is important for all to stay safe. They showcased the car seats but requested people to enjoy the interiors of their house rather than Toyota cars. They were very innovative in staying connected with the followers. They also asked people to be responsible as luxury can wait but responsibility cannot. They also make use of the car seats to urge people to take responsibility to flatten the curve of Covid. So the curve of their car seat was compared with the curve of Covid. They also extended the warranty period by two months. When the lockdown gave some relaxations, they used #WeAreSafe to ensure their customers that their safety would be taken care of.

Maruti Suzuki (257 posts, 28.7K followers)

They urged people not to drive during lockdown and stay inside. They used hashtags like #FlattenTheCurve, #GearUpForTomorrow, #SelfIsolation, #WorkFromHome, #IndiaFightsCorona and #BreakTheChain. They gave tips for car care. They also asked followers to share their throwback pictures. They also used #SocialResponsibility to ensure public safety and their contribution in the form of distribution of 2 million face masks.

Hyundai India (2345 posts, 863K followers)

Hyundai was very active on Instagram. They asked followers to stay safe and that the key to safety is to stay at home. They used hashtags like #FlattenTheCurve, #HyundaiCares, #StayHome, #StaySafe, #WePledgeToBeSafe, #ProgressForHumanity. This company sells cars but urges people not to drive. They asked people to stop the wheels to race ahead. They also used #0KMPH. They were also very innovative in their promotion during the lockdown. They used images of engine start and stop buttons and asked people to start distancing and stop the spread of coronavirus. They also asked people to take foot off the pedal and to respect the lockdown. They also posted about their contribution to the CM Relief Fund and distribution of PPE kits and dry rations. They depicted very nicely that the safest destination during lockdown is house and one should stay inside. The brands were really innovative in their promotion both on television and using social media like Instagram. They also highlighted their contribution to society during these tough times. “This pandemic offers great opportunities for firms to actively engage in various CSR initiatives during the crisis, and potentially catalyse a new era of CSR development in the long run.” (He & Harris, 2020, p. 20). Using social media for communicating CSR activities is highly recommended (Kesavan, Bernacchi, & Mascarenhas, 2013) and when the entire world is going through a crisis this becomes even more important. The customers and public are interested in knowing how responsible the companies are. Social media is a trustworthy medium for CSR communication and it helps the companies in building relationships with customers and other stakeholders (Ali, Jiménez-Zarco, & Bicho, 2015).

Is War Rational or Miscalculation and Misperception Matter?

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Abstract- War is costly and it consumes the taste of blood of fighters who are negaged in war and of innocent citizens. It temporarily satisfy the winners and suffers the lossers, but in long-run, both parties suffer. Rationality or miscalculation and misperception always play key roles in determining the potential outcome of wars by the experts and leaders. States' leaders, sometimes, do not calculate the overall impact of war in the internal affairs of the states except their winning in elections through mechanism. Findings show that relative power is often not a good predictor of outcomes of Wars. Our research found and conclude that war is mostly irrational (that means miscalculation and misperception matter) when it is considered from the initiator point of view, but it would be rational when States want to defend themselves against other threat(s), especially in destructive conflicts, but it should follow the international war rules and regulations.

Index Terms- War, Rational, Rationality, Miscalculation, Misperception

I. INTRODUCTION

War is costly and it consumes the taste of blood of the fighters who are engaged in war and of innocent citizens. Also, war temporarily satisfies the winners and suffers the losers. The rationality assumption divides theorists on the causes of war into two camps: the realists and the miscalculation camp. Many realists and expected utility theorists fall into the rationalist camp, while political psychologists and students of bureaucratic politics fall into the miscalculation and misperception camp. Despite this schism, few studies empirically test the overall extent of rationality in decisions for war. If we see the previous Correlates of War (COW), Militarized Interstate Dispute (MID), and

National Material Capabilities (NMC) databases, we find that prior to 1900, war initiators won over 70% of the time.¹ Since 1945, only a third of initiators have won war. In spite of the decreasing win rates, states' leaders initiate wars at an increasing to steady rate over time since 1920.² States' leaders are not learning that war increasingly does not pay. Declining win rates and steady initiation rates provide the main basis for our core argument: miscalculation and misperception are increasing. This argument is bolstered by other findings showing that, for example, relative power is often not a good predictor of outcomes. We divide our discussion into three sections. The first section analyzes the rationality explanation of War. In the second section, we examine the war in the view that it is mostly caused by miscalculation and misperception of actors. The third section includes our arguments and some preventive solutions to war.

In this first section, rationalist arguments will be unraveled. Rationalists' assumption in the debate about the rationality of war is that even rational leaders may end up opting for war under certain circumstances.³ First, a game-theory rationalist approach will be studied in the article 'Is War a Rationality Activity?' of Giacomo de Luca and Petros G. Sekeris and second a more theorized version of rationalist arguments will be explained in the article 'War and Rationality' of James D. Fearon.

In their article 'Is War a Rationality Activity?' Giacomo De Luca and Petros G. Sekeris go for a game-theory approach, in which they use a model of 'guns and butter' to find out at which stage of a conflict it would be rational to prefer deterrence over conflicts. This model contains two agents which make a decision about their armament level in the first stage of the conflict and would have to make a choice during the second stage to attack or not. It is thus a 'static two-stage general equilibrium model.'⁴ Furthermore, their model results in the mix of a deterrence and aggression strategy of parties. The finding of De Lucas and

¹ Wang, Kevin and James Lee Ray, *Beginners and Winners: The Fate of Interstate Wars Involving Great Powers Since 1495*, *International Studies Quarterly*, Vol. 38, No. 1 (March 1994), URL:
https://www.jstor.org/stable/pdf/2600875.pdf?casa_token=f07niDXhfjgAAAAA:My03tZLdrB7qQWz11J7guuJ2ZH1LjQ9ug-pZV88dI0Tz_7xovyl7EDY37y3jzpE4kkjJ6fXY2AXj4ul-k2wOeJV-laFJf4-ByelgrDd1fU-y6ebS5lkK

² Wang, Kevin and James Lee Ray, *Beginners and Winners: The Fate of Interstate Wars Involving Great Powers Since 1495*, *International Studies*

Quarterly, Vol. 38, No. 1 (March 1994), URL:

https://www.jstor.org/stable/pdf/2600875.pdf?casa_token=f07niDXhfjgAAAAA:My03tZLdrB7qQWz11J7guuJ2ZH1LjQ9ug-pZV88dI0Tz_7xovyl7EDY37y3jzpE4kkjJ6fXY2AXj4ul-k2wOeJV-laFJf4-ByelgrDd1fU-y6ebS5lkK

³ D. Fearon, James. 'Rationalist Explanations of War', *International Organization: MIT Press*, Vol. 49, No. 3, p. 379

⁴ De Luca, Giacomo and G. Sekeris, Petros. *Is War a Rational Activity?*, 2008, p. 3

Sekeris is that any weapon built creates the possibility of war due to the fact that a positive weapons' production generates an imperfect deterrence.⁵ More precisely, in this economic model, two economic agents have the choice to invest their resource endowment over two goods, which are guns and butter. In this model, war is understood as a zero-sum game. Two outcomes are tested: a destructive war and a non-destructive war. De Lucas and Sekeris generated two propositions for the non-destructive war which are that in a non-destructive conflict war strategy would prevail over deterrence strategy no matter what and that there exists a 'unique stable pure strategy equilibrium' in the case of non-destructive conflicts.⁶ Also, the destructive conflict possibility made both authors extrapolate three other propositions: first, that there is always an equilibrium in case of conflict; second, that a 'pure strategy deterrence equilibrium never exists'⁷ and that 'a stable pure strategy war equilibrium exists if and only if $\delta > \delta_c$, where δ represents the destructiveness of war.⁸ Those five propositions lead De Lucas and Sakeris to their theorem that 'if aggregate spending in guns is strictly positive, war always occurs with positive probability'.⁹ Their model unravels the possibility of peace in war when both agents select their deterrence investment in guns in the first stage of the war, which would make both parties prefer the peace option because of the high quantity of guns of their opponents. This specific destructive war scenario would lead to a peaceful outcome, which was not mentioned in previous models neglecting the deterrence strategy. Thus, this article shed a new light on the rationality of war in which 'non-destructive conflicts' would lead to a war equilibrium whereas 'destructive conflicts' would lead to mixed strategy equilibria. In the latter case, agents would have complementary probability of opting for a deterrence strategy and a war strategy.¹⁰

According to Fearon in his article 'Rationalist Explanation of War', there are three mechanisms explaining that some rational political leaders may end up choosing war. The first one is that during war prevention negotiations many information about military capacities of states are unknown to others. In order to bargain a more favorable deal, one state might have incentives to misrepresent their real military capacities in order to gain a better deal afterwards. Hence, war would occur not only because of an unintended lack of communication, but from a strategic lack of divulged military information and asymmetric information. The second valuable rationalist argument is that potentially conflictual states would be unable to concert on an agreement that would satisfy both parties because of commitment problems, which refer to 'situations in which mutually preferable bargains are unattainable because one or more states would have an incentive to renege on the terms.'¹¹ The last rationalist argument accepted

by Fearon is that parties may not find an agreement that would meet both expectations because of 'issue indivisibilities', which means that some issues can not lead to concessions from both sides because of their inherent nature. Some examples of issue indivisibilities Fearon mentioned are 'abortion in domestic politics and the problem of which prince sits on the throne, of, say, Spain, [...]'.¹² Nonetheless, Fearon rejects three commonly accepted rationalist arguments since they do not directly answer the main question of the debate which is: 'What prevents states in a dispute from reaching an ex ante agreement that avoids the costs they know will be paid ex post if they go to war?'.¹³ Those three arguments are the anarchy argument, the preventive war argument as well as the positive expected utility argument. The anarchy argument states that in the absence of a hegemonic international superpower, there is no force able to prevent war from happening. According to the logic of this argument, no state would be able to settle peacefully by itself; there is a need for an external hegemonic figure to enforce law. However, this argument does not answer the question why would the state have any incentive to use force if it is always a costly choice? By not answering this question, the anarchy argument is unable to tackle the war's ex post inefficiency issue. The preventive war argument puts forward that it is rational for a declining power state to declare war to a rising power if it thinks that the latter have high probabilities of attacking. The problem with this argument is that it does not take into account the possibility of bargaining between two states to prevent war. Indeed, if war is again considered as always costly, bargain should be the preferred option of both parties no matter what. It is thus not rational for the declining power to fear a declaration of war from their rising opponents. The positive expected utility argument is also not valuable according to Fearon. This argument set forth that war is a possible outcome when two or more states judge that the expected benefits of fighting counterbalances the expected costs of war.¹⁴ This argument has not yet answered the question when would it be rationally preferable for two states to go for war instead of peace agreements. Therefore, all of those three rationalist arguments are not valid according to Fearon.

There are very few scholars who, in any methodological tradition, have attempted to test the overall extent of miscalculation and misperception in decisions for war. The main reason for this gap is that scholars who emphasize miscalculation and misperception tend to do case studies, while large-*N* scholars tend not to assess miscalculation and misperception.¹⁵ For example, in Geller and Singers review of the findings of 500+ large-*N* analyses on the causes of war, they claimed that miscalculation and misperception are important, but they then cast

⁵ De Luca, Giacomo and G. Sekeris, Petros. 'Is War a Rational Activity?', 2008, p. 3

⁶ Ibid, p. 6

⁷ Ibid, p. 6

⁸ De Luca, Giacomo and G. Sekeris, Petros. 'Is War a Rational Activity?', 2008, p. 3 and 7

⁹ De Luca, Giacomo and G. Sekeris, Petros. 'Is War a Rational Activity?', 2008, p. 7

¹⁰ Ibid, p. 8

¹¹ Ibid, p. 389

¹² D. Fearon, James. 'Rationalist Explanations of War', *International Organization: MIT Press*, Vol. 49, No. 3, p. 382

¹³ Ibid, p. 395

¹⁴ Ibid, p. 379

¹⁵ Dan L and Ryan S. *Is war rational: the extent of miscalculation and misperception as causes of war*, 2005, URL:

http://citation.allacademic.com/meta/p_mla_apa_research_citation/0/6/4/5/2/page_s64522/p64522-1.php

aside the issue by arguing that the subject can best be examined with case studies.¹⁶

The study of wars' outcomes is crucial for two reasons. First, success in war is the best way to judge the utility of war. The more initiators win, the higher the expected utility of war. The second reason to study war outcomes is to learn more about the predictability of these outcomes. The extent to which war is a calculable bet is directly related to participants' utilities of engaging in war. For example, relative power should be one of the most powerful predictors of war outcomes. As the National Material Capabilities (NMC) documentation makes clear, relative power is not easy to measure, but it is easier than strategy, morale, domestic politics, or other more elusive determinants of outcomes (2004).¹⁷ If relative power is a good predictor of outcomes, this should reduce miscalculation and misperception and help deterrence. On the other hand, as the ability of relative power to predict war outcomes declines, war outcomes must then increasingly depend on more elusive variables. This in turn increases the odds of miscalculation and misperception. In sum, aggregate win and loss ratios provide a first attempt at judging the utility of war. Predictability of outcomes then tells us more about the utility of war as a policy tool.

There is a problem with the assessment of wars. For example, Wang and Ray¹⁸ use a dataset of 105 great power wars going back to 1495 in order to explain the rationality of war.¹⁹ They found that initiators were significantly more likely to win than their targets in the 19th and 20th centuries with win rates of 56%, 52%, 53%, 74% and 67% from 15th to 20th centuries.²⁰ In spite of these findings the authors took a neutral position by saying that the variation in win rates offers support for both rationalist and miscalculation/misperception camps. That creates a new puzzle. They only take into account great power wars instead of all wars. Assessing all wars, we find the winning rate decreasing over time. In addition, if we look at the databases of Correlates of War (COW), Militarized Interstate Dispute (MID), and National Material Capabilities (NMC), we find that initiators won 55% of the 79 large interstate wars between 1815 and 1991.²¹ The utility of war has declined markedly over time. In the 47 wars since 1900, the success rate declined to 43%. Since 1945, initiators won

33% of 23 wars. Despite declining win rates, states initiate wars at an increasing to steady rate over time since 1920.²² Thus, states are not learning that war does not pay.

Declining win rates and steady initiation rates provide the main basis for our core argument: miscalculation and misperception are increasing. This argument is bolstered by other findings showing that, for example, relative power is often not a good predictor of outcomes. However, we do claim that war increasingly results from miscalculation and misperception. We build on this useful study in several ways. We gain leverage by looking at all major interstate wars, not just great power wars. By looking at 79 wars over the last 200 years, instead of 108 wars over 500 years, we reduce the *N* somewhat, but increase temporal commensurability between the wars. We examine the influence of relative power in more depth, and we focus on the rationality of war. Finally, we find that the rationality explanation does not outweigh other factors of wars, including miscalculation and misperception.

To examine the "Is War Rational or Miscalculation and Misperception?" question, we assume that countries start wars so as to win. When we see initiators win, we assume that states' leaders made a rational choice. A loss indicates a miscalculation and/or misperception.

II. ARGUMENTATION

First, we begin with the definition of some key concepts: war, miscalculation, misperception, and rationality. War is understood as a 'strategic interaction rooted in hostile intent, and chosen for political/policy goals which can be met by compelling the enemy by force.'²³ Misperception occurs when incorrect data are received by the decision-maker and when the decision-maker distorts those information. Imperfect information always generates misperception. Misperception can cause miscalculation. Miscalculation occurs when a decision-maker obtains non-intended results. Perfect rationality means making decisions to maximize utility based on perfect information about all the available choices and their consequences. If all states and actors

¹⁶ Geller, Daniel S. and J. David Singer, *Nations at War: A Scientific Study of International Conflict* (Cambridge, UK: Cambridge University Press, 1998, URL: <https://homepage.univie.ac.at/heinz.gaertner/wp-content/foalien-13junipw.pdf>

¹⁷ Dan L and Ryan S. *Is war rational: the extent of miscalculation and misperception as causes of war.*, 2005, URL: http://citation.allacademic.com/meta/p_mla_apa_research_citation/0/6/4/5/2/page_s64522/p64522-1.php

¹⁸ Wang, Kevin and James Lee Ray, *Beginners and Winners: The Fate of Interstate Wars Involving Great Powers Since 1495*, *International Studies Quarterly*, Vol. 38, No. 1 (March 1994), URL: https://www.jstor.org/stable/pdf/2600875.pdf?casa_token=f07niDXhfjgAAAAA:My03tZLdrB7qQWz11J7guuJ2ZH1LjQ9ug-pZV88dI0Tz_7xovyl7EDY37y3jzpE4kkjJ6fXY2AXj4ul-k2wOeJV-laFJf4-ByelgrDd1fU-y6ebS5lKk

¹⁹ Wang, Kevin and James Lee Ray, *Beginners and Winners: The Fate of Interstate Wars Involving Great Powers Since 1495*, *International Studies*

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https://www.jstor.org/stable/pdf/2600875.pdf?casa_token=f07niDXhfjgAAAAA:My03tZLdrB7qQWz11J7guuJ2ZH1LjQ9ug-pZV88dI0Tz_7xovyl7EDY37y3jzpE4kkjJ6fXY2AXj4ul-k2wOeJV-laFJf4-ByelgrDd1fU-y6ebS5lKk

²⁰ *Ibid*, p. 145

²¹ *Ibid*, p. 144

²² *Ibid*, p. 146

²³ Von Clausewitz, Carl. *On War*, Princeton University Press, 1976, New Jersey, URL: https://cf75bcf4-a-62cb3a1a-sites.googlegroups.com/site/gwupsc003/readings/clau.pdf?attachauth=ANoY7coI_8u63kF2F_HdFMAji4UlibevOI1R9dKf94pxkMbRR70GXuEJ3a_Iz45o6KPdy9LAcjAmm1KBt6lexEn94eFCdh5ks-sAL5tCPUiYrZfHiWnIOimrB0T3yFkwoq3O9fRac4do92T1swjuDyyK4f5uYID9BWUBshpiczPYInFL72pgN6PG7TH5EZaumGtDaojn8J0R7kmQ8XnbMcWf1Llq-UHYKA%3D%3D&attredirects=0

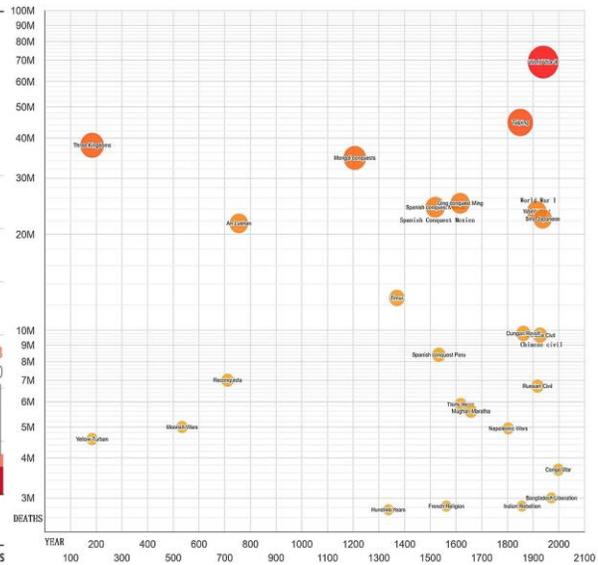
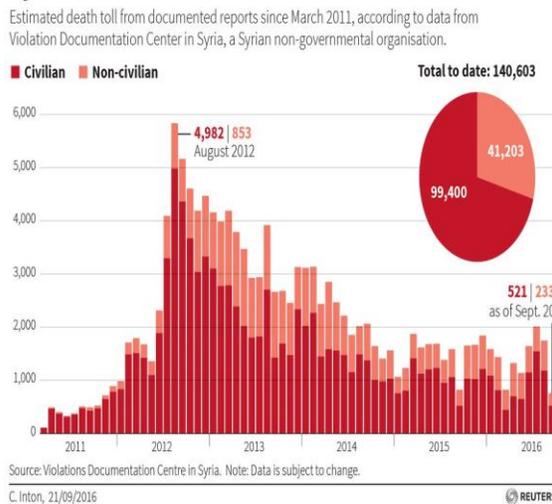
were perfectly rational, war would be rare because states could predict outcomes in advance and losers in particular would, presumably, have strong incentives to prevent war.²⁴

Furthermore, we look back to war history and its impact on states' socioeconomic spheres. We know that wars are costly endeavors. According to the Stockholm International Peace Research Institute (SIPRI) Military Expenditure Database, the approximate estimated costs of wars in 1992 and 2016 were 1.136 and 1.686 billion constant US dollars for the 2011 record or 1.699 billion constant USD respectively, which represents 2,2% of the world's GDP. In addition, at least 108 million people were killed in wars in the twentieth century.²⁵ The SIPRI death reports of some

major wars unravel the corresponding number of deaths for the following conflicts in chronological order:

- ❖ World War I (1914- 1918) - over 15 million
- ❖ Korean War (1950- 1953) - over 1.2 million deaths
- ❖ Second Congo war (1998- 2002/3) - up to 5.4 million deaths
- ❖ Iraq war (2003 - Mid-2011)- around 0.5 million deaths (BBC report, 2013)
- ❖ Syrian civil war (up to 2016)- over 0.5 million deaths (UN and Arab League, 2016)

Syrian civil war fatalities



Source: Stockholm Institute for Peace Research Institute.

If we care about the lives of those people and economic losses, an alternative solution to war should be found. In this sense, war seems irrational.

Also, war is not rational in the sense that it entails the risk of massive destruction for both sides of the conflict. As De Lucas and Sekeris put forward in their game theory of war, any weapon built increases the possibility of war. Therefore, it would be rational not to initiate war in the first place. However, the possibility of war can cause deterrence from the opponent in the case of a destructive war. Even though the second scenario can generate status quo for some time, it can degenerate in the long run according to our understanding because of the agents incentive to develop more refined weapons in order to answer possible attacks from potential opponents. Therefore, we argue that the irrational position aggregated advantages are greater than their disadvantages.

However, war may be rational under some circumstances. As Fearon mentioned in his article 'Rationalist Explanation of War', war can be rational when two parties are unable to find common agreement because at least one party has no incentives to

accept this agreement. In other words, the implications of an agreement may be cruel or unjust towards the second party's citizens and thus seem unacceptable. Also, a leader can prefer war over peace settlement to get a better deal in the future by misrepresenting their true military capacities. The intent there would simply be to hide their true military power in order to wait for better deals. Political leaders have access to privileged military information such as 'military capabilities, strategy, and tactics; the population's willingness to prosecute a long war; or third state intentions.'²⁶ The asymmetric information of one state over another can lead this state to rationally think that its benefits from war would be greater than its losses and hence, lead to a certain victory. As Fearon, we believe that political leaders may rationally opt for strategic asymmetric information rather than misperceive another opponent capacity because 'two rational agents having the same information about an uncertain event should have the same beliefs about its likely outcome.'²⁷ It would be in the state's interest to misinform the other about its military capacity. In those

²⁴ D. Fearon, James. 'Rationalist Explanations of War', *International Organization: MIT Press*, Vol. 49, No. 3

²⁵ Chris Hedges. 'What Every Person Should Know About War'(2003). Available at: <https://www.nytimes.com/2003/07/06/books/chapters/what-every-person-should-know-about-war.html>

²⁶ D. Fearon, James. 'Rationalist Explanations of War', *International Organization: MIT Press*, Vol. 49, No. 3 p. 392

²⁷ Ibid, p. 392

two senses, war can be a rational path of political leaders without taking into account general losses.

Finally, we conclude that war is more irrational than rational *ceteris paribus*. Rationality of war arguments are mostly directed towards defense of one agent's population whereas irrationality of war arguments are directed towards losses of all parties included in the conflict. Thus, one should forget its national pride for peace and understand himself as a world citizen first and foremost. From this standpoint, this agent has no opponent and there is nothing to win in war other than death and sufferings of other humans.

III. RATIONAL SOLUTION AND CONCLUSION

In light of what has been said, war is mostly irrational when it is considered from the initiator point of view, but it would be rational when States want to defend themselves against other threat(s), especially in destructive conflicts, but it should follow the international war rules and regulations. Game theory arguments as well as misconception (and misperception) arguments both give new perspectives to the rationality of war conflict. However, we would mostly consider war as irrational because of the important costs it encompasses in general. In order to limit the incentives of States to opt for war as much as possible, we identified two major solutions to conflicts. Some rational solutions to war can come from a third party intervention, namely the United Nations. Indeed, the United Nations institutions have proven their relevant role as conflict solver after the Second World War as well as during numerous conflicts of the twentieth and twenty-first century. Plus, the United Nations has a higher probability of being an objective conflict manager than any other third party because it is not a State actor and hence does not serve its own interests. However, one may question its legitimacy in interfering into domestic politics of other countries. One other solution to war would be international trade. William Polachek Solomon in his article 'Conflicts and Trade' considers international trade as a natural peace making procedure by mutual economic dependencies created. Those mutual dependencies between States would increase the costs of conflict and would give incentives for both parties to cooperate. Since countries sharing important international trade relations should experience less conflicts and since the most strategic trade relations would create the most deterrent incentive of trade on conflict, one can come to the conclusion that trade is a natural peacemaking process between countries, which is often more long-lasting than when peace is imposed. Hence, even though war can be rational under some circumstances, such solutions would always be more preferable than the option of war.²⁸ Finally, it would be relevant to

investigate the rationality of conflict intervention in order to understand if those interventions are always rational in order to prevent conflicts., such as UN interventions for further research.

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²⁸ Polachek, Solomon William. 'Conflicts and Trade', *The Journal of Conflict Resolution: Sage Publications. Inc*, 1980, Vol. 24, No. 1, pp. 55-57, URL: https://www.jstor.org/stable/pdf/173934.pdf?casa_token=17o7_i_ibZcAAAA:VFfa6Tq1VZwxRjBpDBXJQsEhwK33PbDX3_gSyvLdviFrtmGnW_JCfwiqAcKjsHOMzZEcOMG7NGR9sbCgrdB2ICG-p5c-AUPCCIGIOb5Ly5WfHRVkf26

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Analysis and Prediction of Student Performance Using Data Mining Classification Algorithms

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Abstract- Predicting students' performance over a given period of time is one of the greatest challenges faced by the academic sector in this present time. Data mining techniques could be used for this kind of job. In this study, data mining techniques is applied on data collected from students and academic office of Federal Polytechnic Nasarawa State in other to predict students' performances. WEKA data mining tool was used with implementation of six (6) classifiers namely; J48 decision tree algorithm, Bayesian Network, Navie Bayes, IBk OneR and JRip algorithm. Result shows that Bayes registered accuracy of 72%, BayesNet registered accuracy of 74%, J48 registered accuracy approximately 70 %, while OneR, IBK and JR classifiers produced classification accuracy of 63, 69 and 70% respectively.

Index Terms- Clustering, Classification Algorithm, Data mining, Prediction, Weka, Patterns,

I. INTRODUCTION

Students' performance prediction is a difficult but useful task that may help to improve the academic environment. Although, this may take different styles of assessment or evolution but at the end, results that provide useful information to help teachers and policy makers are obtained [1].

The system and style of students' performance evaluation has now moved from traditional measurement and evaluation techniques to the use of data mining technique which employs various intrusive data penetration and investigation methods to isolate vital implicit or hidden information [2].

Most technological data generated about students has no sufficient background information that relates students' performance to their academic entry qualification [3]. Some attributes such as race and gender have not been used in predicting students' performance due to their sensitivity and confidentiality.

The importance of some attributes such as course ranking in predicting students' performance was stated in [4]. This predictive task was achieved by applying data mining technique on students' data.

According to [5], students database contains hidden information that can be used to improve students' performance; therefore, it is important to model predictive data mining technique for students' performance in order to identify the gap between learners.

Previous studies applied data mining techniques for predictions using attributes such as enrolment data, Performance of students in certain course, grade inflation, anticipated percentage of failing students, and assist in grading system [6].

This paper use data mining techniques to predict student performance based on attributes such as student's personal information (i.e. students' sex, branch, category, living Location, family size, family type, annual income, qualification) and grades in a program study plan. Using all the courses that are mandatory in the study plan, analysis is made to identify the courses that have greater impact on final GPAs

II. RESEARCH METHODOLOGY

The systematic design of the research processes involves five (stages) namely; literature review, data gathering, pre-processing, experimentation and results interpretation as shown in Fig. 1.0 below

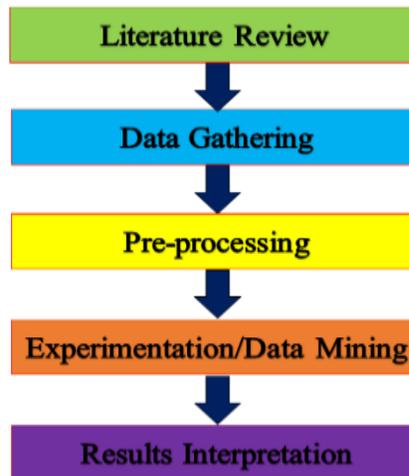


Figure 1.0 Research Methodology

A. Literature Review

Data mining is the process of discovering meaningful patterns in large amount of data. Its application in educational data is termed, Educational Data Mining (EDM). Patterns identified are used to improve students' learning abilities and administrative decision making [7].

According to [8] various methods of knowledge discovery and data mining are data gathering (data collection from required sources), pre-processing (data cleaning, data integration and transformation), data mining (patterns discovery in data through processes such as data classification, dividing the data into predefined categories based on their attributes), data clustering (finding similarities and differences in a data set's attributes in order to identify a set of clusters to describe the data) and Interpretation (putting a given data pattern or relationship into human interpretable form).

According to [9], implementation of educational data mining can be done through techniques such as decision trees, neural networks, k-nearest Neighbour, Naive Bayes, support vector machines and many others.

A predictive performance study was conducted by [5] on over 300 students across 5 different degree colleges using attributes such as students' previous semester marks, class test grade, seminar performance, assignment performance, general proficiency, attendance in class and lab work in order to predict end of semester mark.

In [9] simple linear regression analysis was used on a sample of 300 students (225 males, 75 females) from different colleges in order to determine factors responsible for students' performance. Result shows that factors like mother's education and student's family income were highly correlated with the student academic performance.

Yadav and Pal (2012) considered factors such as gender, admission type, previous schools marks, medium of teaching, location of living, accommodation type, father's qualification, mother's qualification, father's occupation, mother's occupation, family annual income and so on. In their study, they achieved around 62.22%, 62.22% and 67.77% overall prediction accuracy using ID3, CART and C4.5 decision tree algorithms respectively.

B. Data Gathering

The dataset used in the study consists of primary data generated from the student's admission data available with the Federal Polytechnic Nasarawa Nigeria, local database (FPN Repository 2019, [10]). Data set contains personal information therefore restricted to access. In addition, certain aspects of the dataset were generated through administered questionnaire to the concerned students. Sample of dataset is show in Fig. 2.0 below.

Variables	Description	Possible Values
Gender	Students Sex	{Male, Female}
Branch	Students Branch	{PRE ND, ND, PRE HND, HND}
Cat	Students category	{FT, PT, DL, SP, CC}
HSG	Students grade in High School	{O - 90% -100%, A - 80% - 89%, B - 70% - 79%, C - 60% - 69%, D - 50% - 59%, E - 35% - 49%, FAIL - <35%}
SSG	Students grade in Senior Secondary	{O - 90% -100%, A - 80% - 89%, B - 70% - 79%, C - 60% - 69%, D - 50% - 59%, E - 35% - 49%, FAIL - <35%}
L.Loc	Living Location of Student	{Village, Rural, District, Municipal, Town, }
HOS	Student stay in hostel or not	{Yes, No}
ESize	Student's family size	{1, 2, 3, >3}
FType	Students family type	{Joint, Individual}
FINC	Family annual income	{poor, medium, high}
FQual	Fathers qualification	{no-education, elementary, secondary, UG, PG, PhD}
MQual	Mother's Qualification	{no-education, elementary, secondary, UG, PG, PhD, NA}
PSM	Previous Semester Mark	{Distinction > 75 Upper Credit >60%&<74 Lower Credit >50 &<59% Pass >40 &<49% Fail < 39%}
CTG	Class Test Grade	{Poor - <40%, Average - >40% and <60%, Good - >60%}
SEM_P	Seminar Performance	{Poor, Average, Good}
ASS	Assignment	{Yes, No}
GP	General Proficiency	{Yes, No}
ATT	Attendance	{Poor - <60%, Average - >60% and <80%, Good - >80%}
ESM	End Semester Marks	{Distinction > 75 Upper Credit >60%&<74 Lower Credit >50 &<59% Pass >40 &<49% Fail < 39%}

Figure 2.0 Sample of Dataset

C. Data Pre-Processing

In this research, the data pre-process stage involves data cleaning, data integration and transformation.

D. Data Mining and Experimentation

1). System Flowchart

The six (6) classification techniques used to build the classification model through Using the WEKA Explorer application, are J48 decision tree algorithm (an open source Java implementation of C4.5 algorithm), Naive Bayes Classifiers, k-Nearest Neighbours algorithm (K-NN), OneR and JRip algorithm. Classification accuracy uses ten (10) cross-validation methods. The system flowchart is as shown in Figure 3 below.

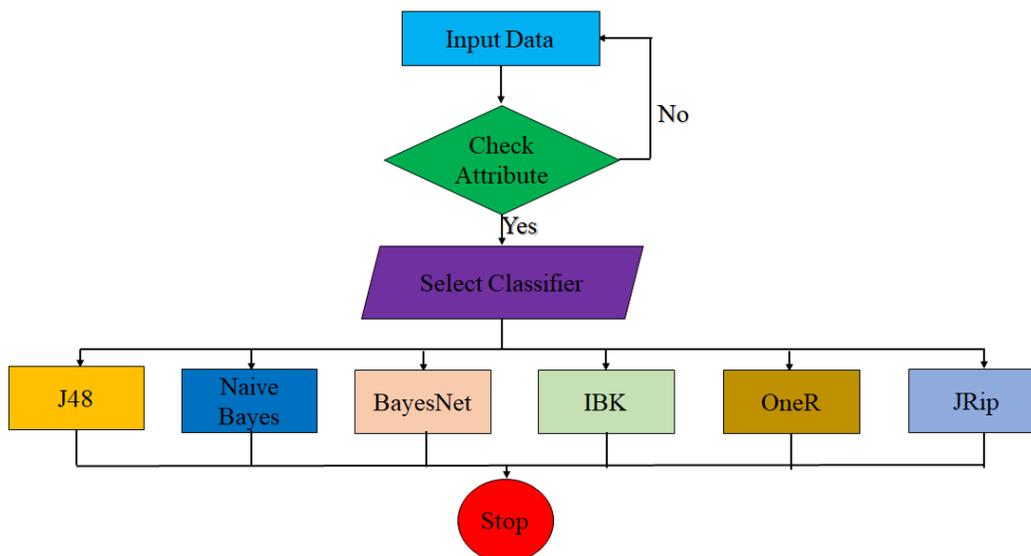


Figure 3.0 The Flowchart of Data Mining Techniques using WEKA 3.9

III. RESULTS AND DISCUSSION

A. WEKA Pre-processing Stage

The screen shot of the WEKA pre-processing stage is as shown in figure 4.0 below.

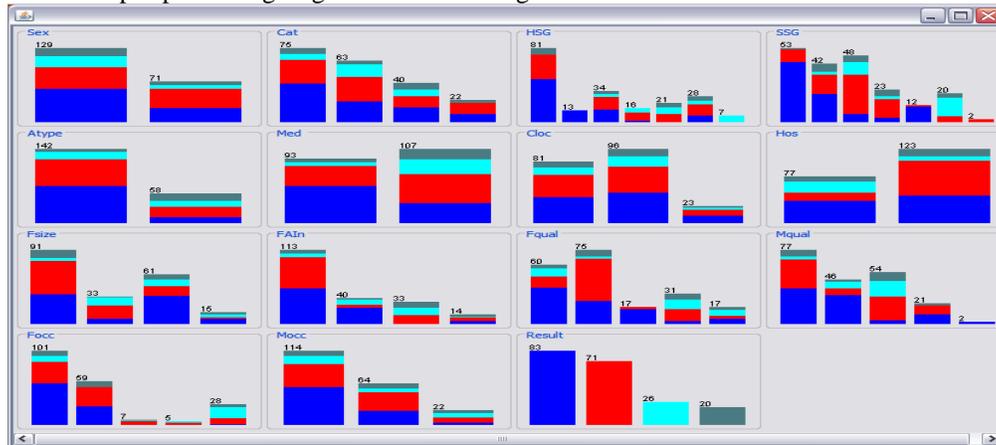


Figure 4.0 WEKA Pre-processing Stage

A. Result of J48 Classification Algorithm

Table 3.1 shows the result of implementation, J48 classification algorithm.

Table 3.1: Result of J48 classification algorithm

Class	J48 – 10-fold Cross Validation		J48 – Percentage Split	
	TP Rate	Precision	TP Rate	Precision
Distinction	0.499	0.601	0.000	0.500
Upper Credit	0.801	0.801	0.990	0.700
Lower Credit	0.701	0.699	0.390	0.800
Pass	1.000	0.801	0.440	1.000
Fail	0.100	0.300	0.200	0.300
Weighted Average	0.699	0.700	0.700	0.700

The results from Table 3.1 show that the True Positive Rate (TP) is highest for class, Pass, (100 %) and lowest for Fail (10%). The Precision rate is highest for class Pass (100 %) and lowest for class Fail (30-10%). It is inferred that J48 has correctly classified about 69.9% for the 10-fold cross-validation testing and 70% for the percentage split testing.

B. Result of Naive Bayes Classifier

Table 3.2 presents the classification results for Naive Bayes classifier.

Table 3.2 Result of Naive Bayes classifier

Class	Naïve Bayes – 10-fold Cross Validation		Naïve Bayes – Percentage Split	
	TP Rate	Precision	TP Rate	Precision
Distinction	0.315	0.490	0.500	0.344
Upper credit	0.839	0.800	0.802	0.800
Lower Credit	0.680	0.739	0.739	0.741
Pass	1.000	0.900	0.900	1.000
Fail	0.170	0.150	0.150	0.100
Weighted Average	0.730	0.710	0.722	0.720

Table 3.2, shows that True Positive (TP) Rate is highest at Pass (90-100%) class and lowest at class Fail (15-17%). The precision is highest at class Pass (90-100%) and lowest at class Fail (10-15%). The classifier correctly classifies approximately 73 % for the 10-fold cross-validation testing and 72.2 % for the percentage split testing.

C. Result of Bayes Net Classifier

Table 3.3 presents the result of Bayes Net Classifier

Table 3.3 Result of Bayes Net Classifier

Class	Bayes Net – 10-fold Cross Validation		Bayes Net – Percentage Split	
	TP Rate	Precision	TP Rate	Precision
Distinction	0.420	0.490	0.470	0.344
Upper Credit	0.900	0.800	0.900	0.800
Lower Credit	0.700	0.800	0.744	0.700
Pass	1.00	0.900	0.822	1.000
Fail	0.100	0.150	0.100	0.000
Weighted Average	0.740	0.720	0.741	0.710

Table 3.3, shows that, Bayes Net correctly classifies approximately 74 % for the 10-fold cross-validation testing and 74.1 % for the percentage split testing. True Positive Rate is highest at Pass Class (100%) and lowest at class Fail (10%).

D. Results of IBk Classification Algorithm

Table 3.4 presents results for IBK classification algorithm.

Table 3.4 Results of IBk Classification Algorithm

Class	IBK – 10-fold Cross validation		IBK – Percentage split	
	TP Rate	Precision	TP Rate	Precision
Distinction	0.200	0.510	0.100	0.100
Upper credit	0.900	0.740	0.740	0.800
Lower Credit	0.600	0.700	0.600	0.600
Pass	1.000	0.900	1.000	1.000
Fail	0.000	0.100	0.000	0.000
Weighted Average	0.700	0.690	0.690	0.640

Table 3.4 shows that IBK classifier correctly classifies about 70 % for the 10-fold cross-validation testing and 69% for the percentage split testing. True Positive Rate is highest at Pass Class (100%) and lowest at class Fail (0%).

E. Results of OneRule Classifier

Table 3.5 shows the classification results for OneR classifier.

Table 3.5 Classification Results for OneRule

Class	IBK – 10-fold Cross validation		IBK – Percentage split	
	TP Rate	Precision	TP Rate	Precision
Distinction	0.200	0.510	0.100	0.100
Upper credit	0.900	0.740	0.740	0.800
Lower Credit	0.600	0.700	0.600	0.600
Pass	1.000	0.900	1.000	1.000
Fail	0.000	0.100	0.000	0.000
Weighted Average	0.700	0.690	0.690	0.640

The OneRule classifier correctly classifies about 65% for the 10-fold cross-validation testing and 63 % for the percentage split testing. True Positive Rate is highest at Upper Credit class (80-90%) and lowest at class Fail (0.0%).

F. Result of JRip Classifier

Table 3.6 Results for JRip Classifier

Class	JR Classifier – 10-fold Cross validation		JR Classifier – Percentage split	
	TP Rate	Precision	TP Rate	Precision
Distinction	0.700	0.620	0.490	0.510
Upper Credit	0.800	0.800	0.900	0.800
Lower Credit	0.700	0.710	0.700	0.644
Pass	1.000	0.700	0.400	1.000
Fail	0.000	0.00	0.000	0.000
Weighted Average	0.720	0.700	0.740	0.700

Table 3.6 shows that JRip correctly classifies about 72 % for the 10-fold cross-validation testing and 74.0% for the percentage split testing. The results also show that TP rate is highest at Pass class (100%) and lowest at Fail class (0%).

F. Performance Comparison Between the Applied Classifiers

The results for the performance of the selected classification algorithms (TP rate, percentage split test option) are summarized and presented in Table 3.7 and 3.8.

Table 3.7 Accuracy Rating

Class	TP Rate for Percentage Split Test Option					
	J48	Naïve Bayes	BayesNet	1Bk	OneR Classifier	JR Classifier
Distinction	Low	Medium	Medium	Low	Medium	Medium
Upper Credit	High	High	High	High	High	High
Lower Credit	Low	High	High	Medium	Low	Medium
Pass	Low	High	High	High	Low	Low
Fail	Low	Low	Low	low	Low	Low
Accuracy Rating	2	4	5	1	1	3

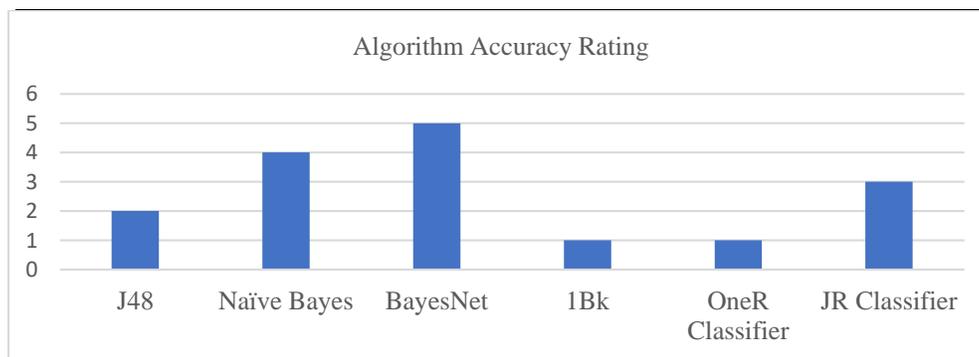


Figure 5.0 Accuracy Rating

Table 1.7 and Figure 5.0 show that BayesNet classifiers has the highest overall prediction accuracy followed by Naïve Bayes. JRip classifier (Rule Learner Classifier) and J48 classifiers (Decision Tree) where moderately accurate while IBK (K-NN Classifier) and OneR (Rule Learner) perform poorly and are less accurate than the others.

G. Overall Accuracy and Prediction Analysis

Table 3.8 Overall Accuracy and Prediction Analysis

Class	TP Rate for Percentage Split Test Option					
	J48	Naïve Bayes	BayesNet	1Bk	OneR Classifier	JR Classifier
Distinction	0.000	0.500	0.470	0.100	0.490	0.510
Upper Credit	0.990	0.802	0.900	0.740	0.900	0.800
Lower Credit	0.390	0.739	0.744	0.600	0.500	0.644
Pass	0.440	0.900	0.822	1.000	0.100	1.000
Fail	0.200	0.150	0.100	0.000	0.000	0.000
Weighted Average	0.700	0.722	0.741	0.690	0.630	0.700

The overall accuracy of all the tested classifiers is well above 60%. Naive Bayes and BayesNet registered accuracy greater than 71% and 74% respectively. J48 produces accuracy of 70%. On the other hand, OneR and IBK classifiers achieved classification accuracy of just 63 and 69% respectively.

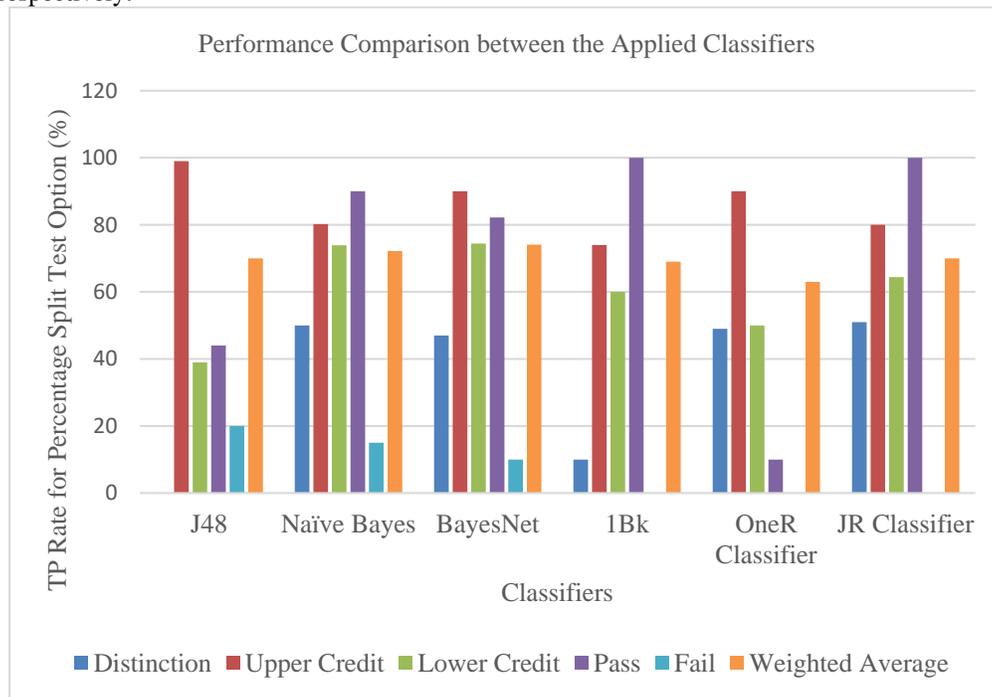


Figure 6.0 Performance Comparison between the Applied Classifiers

From figure 6.0 the predictions are worst for the distinction class (with JRip producing the highest classification accuracy for the Distinction class) and fairly good for the other classes. The classification accuracy is very good for Upper Credit.

IV. CONCLUSION

The results show that the prediction rate is not the same for all the six classifiers as it varies within the range of 60 to 75%. Data attribute such as Upper Credit and Lower Credit tend to have greater influence on the classification process. In the Future, this study will be extended on larger dataset with different classification techniques.

V. FUNDING STATEMENT

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Microbial Assessments of Raw Beef Meat Products from Market Sources in Benin City

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Abstract- This study was aimed at investigating the microbial composition of raw beef meats sourced from markets with a view to assessing the quality, quantity and diversity of microorganisms. The results of this study revealed that the total viable bacterial counts of raw beef meat ranged between $35.58 \times 10^3 \pm 04.56$ cfu/g and $48.00 \times 10^3 \pm 06.4$ cfu/g, while the fungal counts ranged between $10.36 \times 10^3 \pm 02.03$ cfu/g and $16.80 \times 10^3 \pm 03.37$ cfu/g. The mean microbial counts revealed that the total viable bacterial counts had its highest and least counts recorded in the open market and cold room while the fungal counts had its highest and least counts recorded in the abattoir and cold room. Eleven (11) bacterial and six (6) fungal isolates were identified from the market sources. Species of *Penicillium*, *Aspergillus niger* and *Aspergillus flavus* recorded the highest frequency of occurrence of 41.18%, 32.00% and 45.45% in the abattoir, open market and cold room respectively. The total viable bacterial counts and fungal counts revealed no significant difference ($p > 0.05$) across the market sources. There were high levels of antibiotic susceptibility of the bacterial isolates to ciprofloxacin (CPX), gentamicin (CN) and ofloxacin (OFX), while most bacterial isolates were resistant to cloxacillin (APX), co-trimoxazole (SXT) and chloramphenicol (CH). The methicillin resistant status of all the bacterial isolates showed 100% susceptibility to methicillin (AAN). The plasmid profile result showed the bands of resistant bacterial isolates making them plasmid mediated. Therefore, microbial assessments of raw beef meat products should be encouraged by the relevant health sectors to checkmate microbial load in raw beef meats.

Index Terms- Raw beef meat, market sources, antibiotic susceptibility, plasmid profiles.

I. INTRODUCTION

Meat, an excellent source of protein in human diet is highly susceptible to microbial contaminations, it causes spoilage and food-borne infections in human, resulting in economic and health losses (Komba *et al.*, 2012). Although the muscles of healthy animals do not contain microorganisms, meat tissues get contaminated during the various stages of processing ranging from slaughter to transportation (Ercolini *et al.*, 2006). A great diversity of microbes inhabits fresh meat, but different types may become dominant depending on pH, composition, textures, storage temperature and transportation means of raw meat (Ercolini *et al.*,

2006; Li *et al.*, 2006; Adu-Gyamfi *et al.*, 2012). Meat, a rich source of protein and fat, low in carbohydrate contents with sufficient water activity supports the growth of both spoilage and pathogenic bacteria. Major spoilage organisms in raw meat and poultry includes *Pseudomonas* spp., others are *Shewanella* sp., *Brochothrix* sp. and members of enterobacteriaceae. Growth of yeasts and molds is essentially slow on fresh meat as compared to bacteria; therefore, they are not major component of spoilage flora. Raw meat may harbour many important pathogenic microbes such as *Salmonella* spp., *Campylobacter jejuni*, *Campylobacter coli*, *Yersinia enterocolitica*, *E. coli*, *S. aureus* and to some extent, *Listeria monocytogenes* making the meat a risk for human health, as without the proper handling and control measures of these pathogens, food borne illnesses may occur (Nørnung *et al.*, 2009). Beef is processed in abattoir, and the design of abattoirs varies from person to person and from state to state including ownership but they are principally a place where livestock are slaughtered (Marriott, 2004). A number of slaughter facilities are found in an abattoir, whether stationary or mobile. These facilities could be a source of contamination to the slaughtering processes. It has been reported that abattoirs are not 100% hygienic (Gill *et al.*, 2005). Different factors could contribute to the contamination of beef products processed in abattoirs especially during processing and manipulations such as skinning, evisceration, storage and distribution at slaughter houses and retail establishment. In most developing countries, their traditional methods of handling, processing and marketing of meat undermine quality whereas poor sanitation leads to considerable loss of product as well as the risk of food-borne disease (Garcia, 2007). Bacteria which are responsible for food borne diseases contaminate meat directly and indirectly especially from animal excreta at slaughter process (Emswiller *et al.*, 1976). They can also be transferred from beef-contact surfaces, utensils and other slaughtering equipment (Yen, 2003). The external contamination of meat constitutes a major problem in most developing countries' abattoirs where they are potential sources of infection as microbial surface contamination of carcasses has been repeatedly reported to have a significant effect on the meat shelf life of beef. Moreover, contaminants may also include pathogens such as *Salmonella* sp., *Vibrio cholerae*, *Escherichia coli* and *Listeria* sp. which can contaminate the meat thereby causing severe problem for consumers (Elmossalami, 2003). Faecal matter is a major

source of contamination and could reach carcasses through direct deposition as well as by indirect contact through contaminated and unclean carcasses equipment, surfaces, workers, installations and air (Burch *et al.*, 2002). Fortunately, most of the bacterial colonies which have been isolated from beef carcasses are said to be non-pathogenic, except for few human pathogens such as *Salmonella* sp. *Campylobacter* sp. and *Listeria* sp. which have been isolated in a number of cases (Emswiler *et al.*, 1976).

The beef meat available for sales comes through a long chain of slaughtering and transportation from market sources (abattoir, open markets and closed markets), where each source may pose a risk of microbial contamination. The sanitary conditions of abattoirs and its surrounding environments are major factors contributing to bacterial contamination of meat (Gill *et al.*, 2000). Contaminations can be aggravated during transportation, storage and handling of meat at butcher shops. In accordance with HACCP (Hazard analysis critical control point), food safety requirements should be followed strictly to control the food-borne illnesses and to keep the microbial load of raw meat in checked. Meat is an important source of protein, but however can be an important source of human infection. About 75% of emerging human infectious diseases are thought to have come from animals, including wildlife. Considering the processing of meats from unhygienic environments in developing nations, this study therefore seek to investigate the microbial composition of meats sourced from markets, particularly those implicated in disease forms in humans. Infection is defined as the entry of harmful microbes into the body and its multiplication in the tissues / bloodstream (Jennie, 2001) resulting to complications. The infection may remain localized, subclinical and temporary if the body's defensive mechanisms are effective. A local infection may persist and spread by extension to become an acute, sub-acute or chronic clinical infection or disease state. The study also seeks to assay possible contaminants or disease-causing microbes and the healthy state of meat products for human consumption, to determine at what stage the meat products gets contaminated, either at the abattoir, at sales points or cold room as well as the virulent nature and possible way to check the menace. The aim of the study was to investigate the microbial composition of meats products from market sources with a view to assessing the quality, quantity and diversity of microorganisms in Benin City. The specific objectives of our study was to enumerate the microbial population of meat products, isolate, characterize and identify microorganisms from meat sources in Benin City, Nigeria, determine the antibiotic susceptibility pattern of the bacterial isolates and the frequency of occurrence of the microbial isolates, to determine the methicillin resistant status (susceptibility pattern) of the bacterial isolates and the plasmid profile of the bacterial isolates.

II. MATERIAL AND METHODS

This research work was carried out in Benin City, Edo State, Nigeria. Meat products were purchased from Bob Izua Slaughter House, Ikpoba Hill Market and Cold Room, all in Benin City. The experimental analyses of this research were carried out in Department of Microbiology, Faculty of Life Sciences, University of Benin, and the plasmid profiling of the bacterial isolates were carried out at the Molecular and Virology Laboratory of the

International Institute of Tropical Agriculture, Ibadan. Beef meat samples were collected from Bob Izua Slaughter House, Ikpoba Hill Market and meat cold room in Ikpoba environs, Benin City. Samples were collected twice every month, for a period of six months between 9am and 11am. Slaughtering is usually carried out in the mornings, apart from samples which were collected from the closed markets, which are the leftover of meat sample from the sales of previous days and were preserved in refrigerators for the next day sales. Samples were collected on a market day and on a non-market day to check for the possible increase or decrease in the microbial load of the meat samples. The market sources include; the Abattoir (Bob Izua Slaughter House), Open Market (Ikpoba Hill Market, where the meats are kept in the tray), and Closed Market (where the meats are in the freezer/cold room), for example, a cold room. The meat products from the Abattoir are transported to the Open Market by vehicles or Wheel Barrows/Keke Nape. In the Open Market, meat products are sold from morning to evening, the leftover are kept in the freezer for the next day market sales. The leftover of the meat sample from the sales of previous days are preserved in refrigerators in the Closed Market for the next day sales. A total of 36 samples were collected from the market sources (Abattoir, Open Market and Closed Market) which comprises of 6 samples per month for the sampling period of 6 months.

A. Enumeration of Microorganisms:

Ten grams (10 g) of the raw beef meat samples was homogenized in a mortar and transferred to 90.0 ml of sterile distilled water. This served as the stock culture (Cheesbrough, 2000). From the stock suspension, 1.0 ml of the sample was aseptically pipetted into a sterile test tube containing 9.0 ml of sterilized distilled water to obtain 10^{-1} dilution. The contents were mixed thoroughly and further serial dilution was carried out to obtain 10^{-3} and 10^{-5} dilutions (Cheesbrough, 2000). Aliquot of 0.1 ml from the 10^{-1} , 10^{-3} and 10^{-5} dilutions was aseptically pipetted and transferred into correspondingly-labeled Petri dishes. This was followed by pouring of prepared, cooled but molten nutrient agar, MacConkey agar, blood agar and potato dextrose agar (oxid) using pour plate techniques. The contents were gently swirled and allowed to solidify at room temperature (Ogunledun, 2007).

B. Preparation of Culture Media:

The following media was used in this study and was prepared according to manufacturer's instruction; nutrient agar, blood agar, MacConkey agar, potato dextrose agar and Muller Hinton Agar.

Microbiological Analyses:

The microbial isolates were characterized and identified based on the cultural, morphological and biochemical characteristic features according to the methods of (Cheesbrough 2000, 2003; Oyeleke *et al.*, 2008) and the methods of Bergey's Manual for Determinative Bacteriology (Buchanan *et al.*, 1974). A loopful of the culture was picked and inoculated into sterilized slant bottles containing prepared nutrient agar (oxid) medium using streaking technique. The slants were incubated at 37°C for 24-48 h after which Gram's staining, spore staining, biochemical tests and sugar fermentation tests were carried out to authenticate the identity of the microbial isolates. The cultural and morphology characteristics of the fungal isolates were identified with the features described by Barnett *et al.*, (1972).

Antibiotic Susceptibility Test:

The agar diffusion techniques as described by (Bauer *et al.*, 1966) were used for the test. Bacterial colonies from the pure culture were transferred into nutrient broth and incubated overnight, thereafter the test organisms were streaked on agar plates using sterile inoculating wire loop. The appropriate multi – disc depending on whether the test organism plated was Gram-negative organism or Gram-positive organism was then placed firmly onto the surface of the dried plates, using sterile forceps. The plates were kept at room temperature for one hour, which allowed diffusion of different antibiotics from the disc into the medium. The plates then incubated at 37°C for 18 – 24 h. Record and interpretations of results were done using the zone sizes according to the methods of CLSI, (2005).

C. Methicillin Antimicrobial Susceptibility Test:

The methicillin antibiotic susceptibility pattern of the isolates was determined using Kirby-Bauer-NCCLS modified disc diffusion techniques (Cheesbrough, 2002). Standardized overnight culture of each isolate were flooded on the surface of Mueller Hinton agar (MHA) plates, the excess drained off, allowed to dry, while the lid was in place. Standard methicillin antibiotic disc was aseptically positioned at a reasonable equidistance on the inoculated MHA plates and allowed to stand for 1 h. The plates in duplicates, were incubated at 37°C for 24 h, diameters of the zones of inhibition produced by the antibiotic disc were measured and recorded.

Isolation of Plasmid DNA and Agarose Gel Electrophoresis:

Plasmid isolation was carried out using the alkaline lysis method as described by Birnboim *et al.*, (1979). Agarose gel electrophoresis of the isolated plasmid DNA was carried out in tris-borate buffer system using 1.2% agarose, for 1 h at 75v. The plasmids DNA were isolated using lysing solution (200mM NaOH, 1% Sodium dodecylSulphate). The lysate was kept in ice for 30 min and centrifuged for 5 min, then phenol: chloroform (1:1) treatment was followed with the clear supernatant. Plasmid DNA were precipitated with equal volume of chilled isopropyl alcohol and DNA pellet was dissolved in 100 µl of TE buffer (diethylether). A 0.8% agarose gel was used to resolve DNA fragment and it was prepared by combining 0.8 g agarose in ten times concentration of Tris acetate ethylene diamine tetraacetate (10 ml 10XTAE) buffer and 90 ml distilled water in a 250 ml beaker flask and heating in a microwave for 2 min until the agarose was dissolved. A volume of 2.5 ml ethidium bromide (5.0 mg/ml) was added to the dissolved agarose solution with swirling to mix, the gel was then poured onto a mini horizontal gel electrophoresis tank and the casting combs were inserted. The gel was allowed to stand for 30 min and the casting comb was carefully removed after the gel had completely solidified. A one times concentration (IX) of Tris acetate ethylene diamine tetraacetate was added into the reservoir, till the buffer covers the agarose gel, 0.5 µl of gel tracking dye (bromophenol blue) was added to 20 µl of each sample with gentle mixing. Twenty (20) µl of the sample was then loaded onto the wells of the gel, the mini horizontal electrophoresis gel set-up was covered and the electrodes connected. Electrophoresis was carried out at 100 - 120 mA for 1 hr. At the completion of the electrophoresis, the gel was removed from the buffer and viewed at a wavelength of 260nm under a UV-light box. The band pattern of the DNA fragments was then photographed with a Polaroid camera and documented using an electrophoresis gel documentation system. “The molecular sizes

of each plasmid were determined by comparison with plasmids of known mass (Datta *et al.*, 1971).

D. Plasmid Curing Procedure:

The isolates that showed resistance to the antibiotics used were subjected to standard plasmid curing methods (Sijhary *et al.*, 1984). The isolates that showed resistance to some standard antibiotics due to presence of plasmids were selected and subjected to SDS plasmid curing treatments. Briefly, 1g of sodium dodecyl sulphate (SDS) was added to 100 ml of nutrient broth. The solution was autoclaved at 121 °C for 15 min, the pH was adjusted to 7.6, and thereafter steamed for 1 h. Fresh 24 h old cultures of the samples were standardized and 0.5 ml was pipetted into the 100 ml broth. Control broth containing no SDS was also subjected to similar treatments. Cultures were incubated with aeration at 37 °C for 24 hr. The cells including those from the control broth were then tested for antibiotic susceptibility. The reason for carrying out susceptibility test was to determine whether the eliminated plasmid was responsible for resistance to the used antibiotic.

E. Statistical Analyses:

The experimental procedure was done in triplicate. The mean values ± standard errors were calculated for both bacterial counts and fungal counts of the samples. The data obtained was analyzed using the parametric test of analysis of variance (ANOVA), at P<0.05 confidence limits for all parameters (Ogbeibu, 2005).

III. RESULTS

The results presented in Table 1 showed the mean microbial counts of meat from market sources. The results of total viable counts ranged from $48.00 \times 10^3 \pm 06.41$ to $35.58 \times 10^3 \pm 04.56$ cfu/g with the count recorded at the open market (B) showing the highest bacterial counts while cold room (C) had the lowest counts. Total coliform counts also ranged from $32.97 \times 10^3 \pm 04.58$ to $16.69 \times 10^3 \pm 03.60$. Total coliform counts for beef samples was least at cold room (C) and highest in open market (B). The staphylococcal counts of the raw beef meat samples ranged from $23.83 \times 10^3 \pm 03.66$ to $20.16 \times 10^3 \pm 03.29$ cfu/g with the counts recorded at open market (B) showing the highest counts and counts recorded at the cold room having the least counts. The fungal counts of raw beef meat ranged from $16.80 \times 10^3 \pm 03.37$ to $10.36 \times 10^3 \pm 02.03$ cfu/g. The highest fungal counts of raw beef meat were recorded at the abattoir while cold room had the least fungal counts. The coliform counts showed significant difference ($p < 0.05$) in the mean microbial counts of meat samples in the open market. The total viable counts, staphylococcal counts and fungal counts revealed no statistically significant difference ($p > 0.05$) across the market sources (Table 1).

Table 1: Mean microbial counts of raw beef meats from Market Sources.

Counts	Market Sources		
	Abattoir	Open Market	Cold Room
Total Viable Bacterial Counts	43.75×10 ^{3a} ±06.41	48.00×10 ^{3a} ±06.41	35.58×10 ^{3a} ±04.56
Coliform Counts	24.80×10 ^{3a} ±03.84	32.97×10 ^{3ab} ±04.58	16.69×10 ^{3a} ±03.60
Staphylococcal Counts	20.88×10 ^{3a} ±03.63	23.83×10 ^{3a} ±03.66	20.16×10 ^{3a} ±03.29
Fungal Counts	16.80×10 ^{3a} ±03.37	16.47×10 ^{3a} ±02.65	10.36×10 ^{3a} ±02.03

Values are mean ± SE; Colony forming unit per gram= cfu/g.

Mean bearing different superscript (a and b) between column differ significantly (p<0.05).

The bacterial isolates identified during this study were *Micrococcus luteus*, *Escherichia coli*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Bacillus subtilis*, *Serratia marcescens*, *Enterobacter aerogenes*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Proteus vulgaris* and *Streptococcus pyogenes*. Cultural, morphological and biochemical features of the bacterial isolates are presented on Table 2.

Table 2: Cultural, Morphological and Biochemical Features of the bacterial isolates

Features	1	2	3	4	5	6	7	8	9	10	11
Cultural											
Elevation	Convex	Flat	Convex	Low convex	Convex	Low convex	Convex	Convex	Convex	Convex	Low convex
Margin	Entire	Undulated	Entire	Entire	Entire	Entire	Entire	Entire	Smooth	Entire	Entire
Colour	Yellow	Cream	Cream	Cream	Cream	Cream	Red	Yellow	White	Cream-white	Cream
Shape	Circular	Irregular	Circular	Circular	Circular	Circular	Circular	Circular	Circular	Circular	Circular
Size	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Small	Small	Small	Medium
Morphological											
Gram staining	+	+	-	-	-	-	-	+	+	+	-
Cell type	Cocci	Rod	Rod	Rod	Rod	Rod	Rod	Cocci	Cocci	Cocci	Rod
Cell arrangement	Single	Chains	Single	Single	Single	Single	Single	Cluster	Chains	Cluster	Singles
Spore staining	-	+	-	-	-	-	-	-	-	-	-
Biochemical											
Catalase	+	+	+	+	+	+	+	+	-	+	+
Oxidase	-	-	-	-	-	-	-	-	-	-	-
Coagulase	-	-	-	-	-	-	-	+	-	-	-
Urease	+	+	-	-	+	+	-	+	-	+	-
Indole	-	-	-	+	-	+	-	-	-	-	-
Citrate	+	+	+	-	+	+	+	+	+	+	+
Sugar Fermentation											
Glucose	+	+	+	+	+	+	+	+	+	+	+
Lactose	-	-	-	+	+	-	-	-	-	-	+
Possible Isolates	<i>Micrococcus</i> sp.	<i>B. subtilis</i>	<i>P. aeruginosa</i>	<i>E. coli</i>	<i>K. pneumoniae</i>	<i>P. vulgaris</i>	<i>Serratia</i> sp.	<i>S. aureus</i>	<i>S.pyogenes</i>	<i>S. epidermidis</i>	<i>E. aerogenes</i>

Key: + = Positive, - = Negative.

Key: F1= Fungal Isolate 1, F2= Fungal Isolate 2, F3= Fungal Isolate 3, F4= Fungal Isolate 4, F5= Fungal Isolate 5, F6= Fungal Isolate 6. A total of six (06) fungal isolates were isolated from the raw beef meat samples obtained from abattoir, open market and cold room. The fungal isolates are *Penicillium* sp., *Aspergillus flavus*, *Mucor* sp., *Saccharomyces* sp., *Rhizopus stolonifer*, and *Aspergillus niger*. Cultural and microscopic features of the fungal isolates are shown on Table 3.

Table 3: Cultural and Microscopic Features of the fungal isolates

Features	F1	F2	F3	F4	F5	F6
Cultural	White fluffy colony with reverse cream	Black fluffy colony with reverse yellow	Greenish yellow colonies with reverse yellow	White flat colony with reverse side cream	Medium creamy colony with convex elevation and entire margin	Greenish colony with white periphery
Microscopic						
Nature of hyphae	Non-Septate	Septate	Septate	Non-septate	Pseudohyphae	Septate
Colour of spore	Cream	Brown	Yellow	Cream	Cream	Greenish
Type of spore	Sporangiophore	Conidiophores	Conidiophores	Sporangiophore	Chlamydo-spore	Conidiophores
Appearance of special structure	Rhizoid	Foot cells	Foot cells	Sporangium	Budding	Brush-like conidia
Possible isolates	<i>Rhizopus</i> sp.	<i>Aspergillus niger</i>	<i>Aspergillus flavus</i>	<i>Mucor</i> sp.	<i>Saccharomyces</i> sp.	<i>Penicillium</i> sp.

Table 4 shows the frequency of distribution of bacterial isolates, with *Staphylococcus aureus* showing the highest frequency of occurrence (18.07%), while *Serratia marcescens* had the least frequency (02.41%) at the open market.

Table 4: Percentage Frequency of occurrence (%) of bacterial isolates

Isolates	Market Sources		
	Abattoir (A)	Open Market (B)	Cold Room (C)
<i>Staphylococcus aureus</i>	10 (19.61)	15 (18.07)	08 (25.00)
<i>Escherichia coli</i>	11 (21.57)	13 (15.66)	05 (15.63)
<i>Pseudomonas aeruginosa</i>	07 (13.73)	11 (13.25)	09 (28.13)
<i>Streptococcus pyogenes</i>	05 (09.80)	09 (10.84)	Nil
<i>Staphylococcus epidermidis</i>	03 (05.88)	08 (09.64)	05 (15.63)
<i>Bacillus subtilis</i>	04 (07.84)	07 (08.43)	Nil
<i>Micrococcus luteus</i>	Nil	06 (07.23)	05 (15.63)
<i>Klebsiella pneumonia</i>	03 (05.88)	05 (06.02)	Nil
<i>Enterobacter aerogenes</i>	08 (15.69)	04 (04.82)	Nil
<i>Proteus vulgaris</i>	Nil	03 (03.61)	Nil
<i>Serratia marcescens</i>	Nil	02 (02.41)	Nil
Total	51 (100)	83 (100)	32 (100)

Table 5 shows the frequency of occurrence of fungal isolates with *Aspergillus niger* showing the highest frequency of occurrence (32.0%) and *Saccharomyces* sp. having the least frequency (4.0%).

Table 5: Percentage Frequency of occurrence (%) of fungal isolates

Isolates	Market Sources		
	Abattoir (A)	Open Market (B)	Cold room (C)
<i>Aspergillus niger</i>	05 (29.41)	08 (32.00)	03 (27.27)
<i>Mucor</i> sp.	02 (11.76)	05 (20.00)	01 (09.09)
<i>Rhizopus stolonifer</i>	03 (17.65)	05 (20.00)	Nil
<i>Aspergillus flavus</i>	Nil	03 (12.00)	05 (45.45)
<i>Penicillium</i> sp.	07 (41.18)	03 (12.00)	02 (18.18)
<i>Saccharomyces</i> sp.	Nil	01 (04.00)	Nil
Total	17 (100)	25 (100)	11 (100)

Table 6 shows the results obtained from the antibiotic susceptibility pattern of the bacterial isolates before curing. It revealed that *M. luteus*, *S. aureus*, *Serratia* sp. and *E. aerogenes* were sensitive to gentamycin. Again, *M. luteus*, *S. pyogenes*, *S. epidermidis*, *Serratia* sp., *P. aeruginosa*, *E. coli*, *K. pneumonia* and *E. aerogenes* were sensitive to ciprofloxacin. However, *M. luteus*, *B. subtilis*, *S. aureus*, *S. pyogenes*, *S. epidermidis*, *Serratia* sp., *P. vulgaris*, *P. aeruginosa*, *E. coli*, *K. pneumonia* and *E. aerogenes* were revealed to be resistant to pefloxacin, amoxacillin and streptomycin.

Table 6: Zone of inhibition of commercial antibiotics (standard sensitivity disc) in mm on the bacterial isolates prior to curing

Gram+ve	PEF	CN	APX	Z	AM	R	CPX	S	SXT	E
<i>M. luteus</i>	0.0(R)	20.0(S)	0.0(R)	13.0(I)	10.0(R)	10.0(R)	19.0(S)	11.0(I)	0.0(R)	18.0(S)
<i>B. subtilis</i>	0.0(R)	17.0(I)	0.0(R)	0.0(R)	0.0(R)	0.0(R)	15.0(I)	08.0(R)	0.0(R)	24.0(S)
<i>S. aureus</i>	0.0(R)	18.0(S)	0.0(R)	0.0(R)	0.0(R)	0.0(R)	13.0(I)	0.0(R)	0.0(R)	15.0(I)
<i>S. pyogenes</i>	0.0(R)	15.0(I)	0.0(R)	0.0(R)	0.0(R)	0.0(R)	20.0(S)	0.0(R)	0.0(R)	20.0(S)
<i>S. epidermidis</i>	0.0(R)	16.0(I)	0.0(R)	0.0(R)	0.0(R)	0.0(R)	18.0(S)	0.0(R)	0.0(R)	13.0(I)
G-ve	SXT	CH	SP	CPX	AM	AU	CN	PEF	OFX	S
<i>Serratia</i> sp.	0.0(R)	0.0(R)	12.0(I)	22.0(S)	0.0(R)	0.0(R)	19.0(S)	0.0(R)	20.0(S)	0.0(R)
<i>P. vulgaris</i>	0.0(R)	0.0(R)	0.0(R)	12.0(I)	0.0(R)	0.0(R)	16.0(I)	0.0(R)	17.0(I)	0.0(R)
<i>P. aeruginosa</i>	0.0(R)	0.0(R)	0.0(R)	18.0(S)	0.0(R)	0.0(R)	10.0(R)	0.0(R)	22.0(S)	0.0(R)
<i>E. coli</i>	0.0(R)	0.0(R)	0.0(R)	20.0(S)	0.0(R)	0.0(R)	16.0(I)	0.0(R)	24.0(S)	0.0(R)
<i>K. pneumoniae</i>	0.0(R)	0.0(R)	0.0(R)	24.0(S)	0.0(R)	0.0(R)	14.0(I)	0.0(R)	26.0(S)	0.0(R)
<i>E. aerogenes</i>	0.0(R)	0.0(R)	0.0(R)	18.0(S)	0.0(R)	0.0(R)	20.0(S)	0.0(R)	28.0(S)	0.0(R)

KEY: PEF = Pefloxacin (10µg), CN= Gentamycin (10µg), CH= Chloramphenicol (30µg), APX= Cloxacillin (30µg), Z= Zinnacef (20 µg), AM= Amoxacillin (30µg), AU= Augmentin (30µg), R= Rocephin (25µg), OFX= Tarivid/Ofloxacin (10µg), CPX= Ciprofloxacin (10µg), S= Streptomycin (30µg), SP= Sparfloxacin(10µg), SXT= Co-trimoxazole (30µg), E= Erythromycin (10µg). S= Susceptible, R= Resistant, I = Intermediate, R= < 11 mm, I =11 – 17 mm, S= ≥ 18 mm.

Table 7 shows the results obtained from the antibiotic susceptibility pattern of the bacterial isolates after curing. After curing, it was observed that Erythromycin and Tarivid became sensitive (effective) against multidrug resistant bacterial isolates. The loss of resistance after curing indicates the presence of the resistance properties in the plasmid. However, *Serratia sp.*, *P. vulgaris*, *P. aeruginosa*, *E. coli*, *K. pneumonia* and *E. aerogenes* were resistant to amoxacillin, co-trimoxazole and augmentin suggesting that the resistant properties shown by bacterial isolates were not plasmid mediated.

Table 7: Zone of inhibition of commercial antibiotics (standard sensitivity disc) in mm on the microbial isolates after curing

Gram+ve	PEF	CN	APX	Z	AM	R	CPX	S	SXT	E
<i>M. luteus</i>	19.0(S)	24.0(S)	16.0(I)	18.0(S)	15.0(I)	18.0(S)	21.0(S)	15.0(I)	13.0(I)	20.0(S)
<i>B. subtilis</i>	11.0(I)	20.0(S)	12.0(I)	0.0(R)	0.0(R)	0.0(R)	18.0(S)	11.0(I)	10.0(R)	28.0(S)
<i>S. aureus</i>	15.0(I)	22.0(S)	11.0(I)	0.0(R)	0.0(R)	13.0(I)	16.0(I)	10.0(R)	11.0(I)	20.0(S)
<i>S. pyogenes</i>	12.0(I)	20.0(S)	15.0(I)	10.0(R)	14.0(I)	10.0(R)	24.0(S)	16.0(I)	10.0(R)	30.0(S)
<i>S. epidermidis</i>	15.0(I)	16.0(I)	11.0(I)	13.0(I)	10.0(R)	14.0(I)	22.0(S)	18.0(S)	12.0(I)	26.0(S)
G-ve	SXT	CH	SP	CPX	AM	AU	CN	PEF	OFX	S
<i>Serratia sp.</i>	10.0(R)	13.0(I)	18.0(S)	26.0(S)	05.0(R)	10.0(R)	22.0(S)	10.0(R)	24.0(S)	13.0(I)
<i>P. vulgaris</i>	07.0(R)	10.0(R)	10.0(R)	18.0(S)	0.0(R)	0.0(R)	20.0(S)	13.0(I)	20.0(S)	14.0(I)
<i>P. aeruginosa</i>	06.0(R)	14.0(I)	10.0(R)	22.0(S)	04.0(R)	0.0(R)	15.0(I)	10.0(R)	25.0(S)	0.0(R)
<i>E. coli</i>	10.0(R)	19.0(S)	15.0(I)	25.0(S)	06.0(R)	0.0(R)	21.0(S)	15.0(I)	28.0(S)	17.0(I)
<i>K. pneumoniae</i>	08.0(R)	13.0(I)	11.0(I)	28.0(S)	0.0(R)	08.0(R)	18.0(S)	11.0(I)	28.0(S)	13.0(I)
<i>E. aerogenes</i>	10.0(R)	15.0(I)	13.0(I)	22.0(S)	10.0(R)	0.0(R)	24.0(S)	12.0(I)	30.0(S)	10.0(R)

KEY: PEF = Pefloxacin (10µg), CN= Gentamycin (10µg), CH= Chloramphenicol (30µg), APX= Cloxacillin (30µg), Z= Zinnacef (20 µg), AM= Amoxacillin (30µg), AU= Augmentin (30µg), R= Rocephin (25µg), OFX= Tarivid/Ofloxacin (10µg), CPX= Ciprofloxacin (10µg), S= Streptomycin (30µg), SP= Sparfloxacin (10µg), SXT= Co-trimoxazole (30µg), E= Erythromycin (10µg). S= Susceptible, R= Resistant, I= Intermediate, R < 11 mm, I = 11 – 17 mm, S ≥ 18 mm.

The antimicrobial sensitivity testing (Table 8) of the bacterial isolates from the meat samples using some broad and narrow spectra antibiotics showed 100% susceptibility (sensitive) to some antibiotics like ciprofloxacin, gentamicin, ofloxacin, while most of the bacterial isolates were found to be resistant to ampiclox, septrin and chloramphenicol.

Table 8: Antibiotic susceptibility pattern using single disc methicillin drug

S/N	Microbial isolates	Zone of inhibition in mm	Susceptibility pattern
1	<i>M. luteus</i>	31.0	S
2	<i>B. subtilis</i>	30.5	S
3	<i>S. aureus</i>	23.0	S
4	<i>S. pyogenes</i>	31.5	S
5	<i>S. epidermidis</i>	31.0	S
6	<i>Serratia sp.</i>	33.0	S
7	<i>P. vulgaris</i>	30.5	S
8	<i>P. aeruginosa</i>	28.0	S
9	<i>E. coli</i>	30.0	S
10	<i>K. pneumonia</i>	31.0	S
11	<i>E. aerogenes</i>	32.0	S

Key: S=Susceptible

The result of the plasmid curing revealed that resistance to some commonly used antibiotics such as septrin, streptomycin and ampiclox by the bacterial isolates were plasmid mediated.

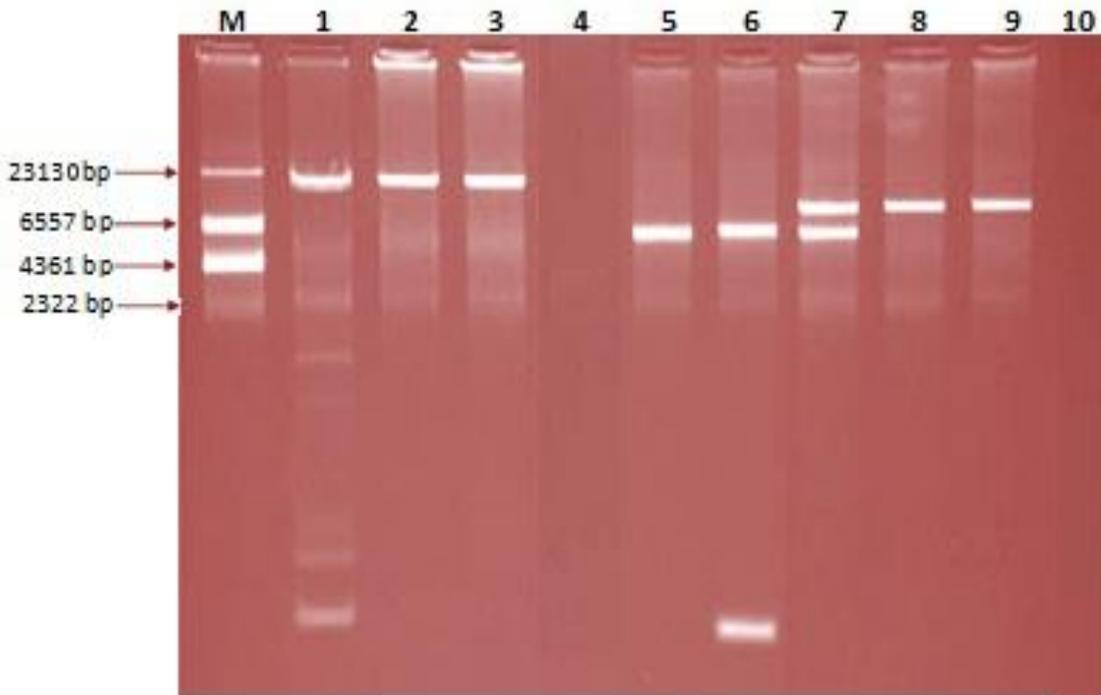


Plate 1: Agarose gel electrophoresis of plasmids harbored by the bacterial isolates. B₁= *Staphylococcus aureus*, B₂= *Bacillus subtilis*, B₃= *Escherichia coli*, B₄= *Enterobacter* sp, B₅= *Micrococcus luteus*, B₆= *Streptococcus* sp., B₇= *Pseudomonas aeruginosa*, B₈= *Staphylococcus epidermidis*, B₉ = *Proteus* sp., B₁₀= *Serratia* sp.

IV. DISCUSSION

Most of fresh food especially that of animal origin like beef is highly vulnerable to microbial invasion and food poisoning since meat is an ideal medium for growth of a number of microorganisms due to its nutritive value (Soyiri *et al.*, 2008). Meat samples from abattoir, open market and cold room yielded marked growth of bacteria and fungi. The presence of these organisms in raw beef meats could mean that these meats contain essentially all nutrients needed for bacteria proliferation in adequate quantity. High microbial load revealed in the raw beef meat from abattoir and open market in this study may be due to the condition of handling, the tables, equipment and machines, which had been used during processing, preparing, and the hygienic practice, employed by butchers.

Adzitey *et al.*, (2011b), reported that the butchering activity is more dominated by the youth and middle-aged men who are more energetic as the butchering business requires much physical strength. During the study, it was revealed that, the abattoir and open market workers had low level of education and this could make difficult in acceptability of modern slaughtering practices as well as adherence to strict hygienic and standard slaughtering practices that contribute to microbial contamination.

It was also discovered that abattoir was often congested with people who were not directly involved with slaughtering and processing of the carcasses which may contribute to contamination of meat with microbes. Most of the vehicles used to transport meat from abattoir to retail meat outlets were taxi, tricycles, wheel barrow and various types of vehicles. The meats were carried in sack bags, open bowls and basins, as well as with bare hands. Sometimes abattoir workers stepped on the meat. This may also contribute to bacterial contamination of meat. The slaughtering of beef carcasses on the bare floor as result of lack of hoists in the abattoir also created room for contamination. Adeyemo *et al.*, (2009), found that the animals were often slaughtered and eviscerated on the floor because of the absence of mechanical or manual hoists a factor which contributed to a major source of contamination.

James *et al.*, (2005), reported that the longer meat surface is exposed to the environment, the higher the microbial load. The meat samples from open market had the highest mean of total viable counts, followed by those from abattoir and finally the meat from cold room had least contamination. The low microbial load in raw beef from cold room could be due to the effect of cooled storage in the refrigerator which was not conducive for microbial proliferation and growth. When comparing the microbial counts of raw meats purchased from the three market sources, results revealed that the open market had the highest bacteria counts ($48.00 \times 10^3 \pm 06.41$ cfu/g) for total viable bacterial counts. The high total viable bacteria counts recorded in this study showed the microbial diversity (differences in form or species) in the market sources, condition of the market and the hygienic practice employed by meat sellers and butchers. This determined the variation of bacterial contamination.

Fresh meats sold to the public in the open market were grossly contaminated with coliform bacteria ($32.97 \times 10^3 \pm 04.58$ cfu/g) as well as other bacterial forms. However, no significant difference was found between the mean total coliform counts of samples in abattoir and cold room. The mean staphylococcal counts and fungal counts of raw meat samples recorded no significant

difference among the three market sources. According to statistical analysis, it was noted that the microbiological quality of most of the raw meat and meat products of Benin City was significantly poor. The finding showed that raw meat and meat products, which were collected from different market sources, were contaminated with pathogenic microorganisms. A total of eleven bacterial isolates covering nine genera were isolated and characterized as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, *Staphylococcus epidermidis*, *Bacillus subtilis*, *Micrococcus luteus*, *Klebsiella pneumoniae*, *Enterobacter aerogenes*, *Proteus vulgaris* and *Serratia marcescens*.

The predominance of *Escherichia coli* (21.57%) in the abattoir, *Staphylococcus aureus* (18.07%) in the open market and *P. aeruginosa* (28.13%) in the cold room were attributed to the handling process such as killing equipment and the water used in washing the meat. Other researchers have reported the presence of *Pseudomonas*, *Escherichia coli* and other gram-negative bacteria in raw meat samples (Lin *et al.*, 2004). No *Salmonella* and *Shigella* was determined, this may be as a result of some preventive measures adopted by the meat handlers to prevent contamination. In contrast to the results of this study, Hayes *et al.*, (2003) found *Enterococcus spp.* to be the most dominant bacteria on 971 of the 981 samples (99%) of all meat (chicken, turkey, pork and beef) in the state of Iowa. Although most of organisms found in this study are normal flora of different parts of man and animal body, some of them have been associated with many disease problems. They might cause disease in their presence in the animal body or by contamination of food. The micro-flora of meats available to consumers is the total sum of microorganisms acquired during processing of animal muscle food. Animal health, dressing skills, personnel hygiene, abattoir cleanliness, and adequate storage and holding temperature during distribution and retail influence the constitution and number of micro-organisms present (Hudson *et al.*, 1996).

This study agrees with Bhandare *et al.* (2007), due to improper/unhygienic handling and processing of the meat, meat is normally transported to the markets in unhygienic meat vans, taxis, motor cycles, motor kings, and sometimes on bicycles. Meat sellers were also observed busily conversing, coughing, and sneezing, which might result in contamination through introduction of saliva on the meat. Okonko *et al.*, (2008) stated that, food can be infected with microorganisms as a result of "coughing" and "sneezing" from those who handle and process these foods. Koffi-Nevry *et al.*, (2011) also stated that, careless sneezing and coughing among butchers can result in microbial contamination of raw beef.

Findings from this study revealed the open market as the most major source of meat contamination in Benin City. During selling in retail meat outlets further contamination can occur through contact with handling equipment (tables, logs, hooks, balances and knives), insects, air, personnel and even consumers (Mtenga *et al.*, 2000). Meat sold to the public in open markets or by streets vendors are grossly contaminated with coliform bacteria as well as other bacterial forms. The finding of this study revealed that meat was contaminated with pathogenic Gram-positive and Gram-negative bacteria. This also implies that these meats are viable source of various diseases. Some of these diseases could spread and acquire epidemic status which poses serious health hazards,

“since improper handling and improper hygiene might lead to the contamination of meat and this might eventually affect the health of the consumers (Okonko *et al.*, 2008, 2009 a, b). It is, therefore, suggested that meat processors and sellers should be educated on the adverse effect of contamination. However, the processors, handlers and sellers should observe strict hygienic measures so that they may not serve as source of chance inoculation of microorganisms and fecal contamination of fresh meats and meat products.

The presence of these organisms in meat should receive particular attention, because their presence indicates public health hazards and give warning signal for the possible occurrence of food borne intoxication (Kabir, 2009). The susceptibility results of bacteria isolated from meat samples showed that they are highly resistant to some of the antibiotics tested such as cloxacillin, amoxicillin and co-trimoxazole. Gram-negative organisms are more resistant than the Gram-positives; this is expected because of intrinsic nature of Gram-negative cell wall. The Gram-negative microorganisms isolated belongs to the *Enterobacteriaceae* family, this group of organisms are always resistant to various classes of antibiotics. They are known to harbour series of antibiotic resistance genes which can be transferred horizontally to other bacteria species. Their resistance to the cephalosporins may be due to the production of beta lactamase enzymes, these enzymes are known to inactivate antibiotics especially the beta lactams. Resistance observed in other antibiotics classes may also be by other mechanisms which may be by drug efflux where drug are forcefully pumped out of the cell thereby allowing a sub-inhibitory concentration to penetrate the cell wall of this organisms, it may be as a result of a point mutation that has occurred in these bacteria thereby allowing the organism to acquire additional structure that will inhibit drug action.

S. aureus showed some level of intermediate susceptibility to erythromycin, even at that, it still possesses some public health problems because when these antibiotics are misused, this organism will develop resistance against it. *Bacillus subtilis* was resistant to most of the antibiotics tested. The results of the curing experiment revealed that majority of bacterial isolates carried the antibiotics genes on transmissible plasmids. The plasmids analysis revealed that there were detectable plasmid DNA genes in Isolates 1, 2, 3, 5, 6, 7, 8 and 9. The plasmids DNA genes isolated in the 0.8% Agarose gel Electrophoresis might be the bacterial contents that confer plasmid resistance on the bacterial isolates. This is in accordance with the result of this study. The plasmid profile analysis examines the total bacterial plasmid content and is separated by electrophoresis. “This method is used to assess the spread of antibiotics plasmid DNA resistance determinates (Clowers, 1972). The use of antibiotics in growing animals and treating bacterial infections could be the reason for the observed resistance, which has a range of human health consequences ranging from protracted illness to death, as endangered patients are those with impaired immunity. In order to produce meat which is safe and wholesome there is a need for use of good animal husbandry practices, good processing practices, good handling practices, standard operating procedures, sanitation standard operating procedures and hazard analysis critical control point system along the beef production chain. The need for microbial assessment of fresh meats and other meat products processed and packaged for human consumption is therefore emphasized and

recommended to reduce possible contamination (Okonko *et al.*, 2009 a, b). The result of this study provides information to existing data on microbial contaminants of meat products. The data generated from this study revealed the contamination status of meat in abattoir, open market and cold room. This study showed that MRSA testing of meat samples is highly effective against microbial contaminants. This study also demonstrates the role of raw beef food acting as a reservoir of antibiotic resistance bacteria that can be transferred to humans, thereby constituting a health problem. This study has provided comparative data on the susceptibility of the bacterial isolates to commonly used antibiotics. Training and guidance programs should be set-up in order to develop awareness among butchers and meat sellers. Education and application of control measures suitable to prevent meat contamination, from slaughtering to selling, through to final consumption is highly recommended. To always present quality meat, health - and standards authorities should keep follows up through testing of samples and executing of regular studies. Good hygienic standard at the various meat sources (abattoir, open market and cold room) should be maintained. It is highly recommended to eat meat after proper cooking.

V. CONCLUSION

The result of this study revealed that fresh meats were contaminated with bacteria and fungi. The presence of pathogenic microorganisms such as *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *E. coli* among others, encountered in fresh meat from conventional beef is alarming. The presence of these organisms in meat foods should receive particular attention, because their presence indicates public health hazard and give warning signal for the possible occurrence of food borne intoxication.

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The Effect of Independent Commissioners and Audit Quality Towards Corporate Profit Management

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Abstract- The purpose of this study is to determine the effect of independent commissioners and audit quality on earnings management in the manufacturing sector in 2017-2018. This study uses a quantitative method using a sample of manufacturing companies listed on the Indonesia Stock Exchange in 2017-2018.

The results of this study indicate that the independent commissioner and audit quality does not affect the company's earnings management because the independent commissioner can still be said to be quite weak but there are no strict sanctions issued by the regulator as part of tightening the implementation of corporate governance. While the audit quality does not affect the company's earnings management. Audit quality does not affect earnings management is the possibility of earnings management practices occur within the company because the company wants the company's performance to look good through the company's financial statements in the eyes of investors and prospective investors, regardless of whether the big four or other Accounting Firm audits the company's financial statements.

Index Terms- independent commissioner, audit quality, earnings management

I. INTRODUCTION

Earning management is an accounting policy option by a manager to achieve certain objectives. Earning management can be viewed from the side of contract drafting and financial reporting. In terms of financial reporting, managers can use earning management to adjust the estimated revenue expressed by analysts, and thereby avoid negative stock price reactions that immediately follow the failure to meet investor expectations. From a contractual perspective, earning management can be used as a way to protect the company from the consequences of unexpected events when contracts are rigid or incomplete (Scott 2006).

The entity theory arises in response to proprietary theories. The entity theory develops due to the fact that the professional manager's profession is growing as the company grows. Companies that increasingly lead to owners who are also managers are no longer able to carry out the functions of the company directly, e.g. initially the function of production, marketing, sales, purchase, finance and other executed directly by the owner, so that the whole function is handed over to the professional manager who is responsible to the owner (Kam 1990). The entity theory develops due to the fact that the professional manager's profession is growing as the company

grows. Companies that increasingly lead to owners who are also managers are no longer able to carry out the functions of the company directly, e.g. initially the function of production, marketing, sales, purchase, finance and other executed directly by the owner, so that the whole function is handed over to the professional manager who is responsible to the owner

Audit is a process of collecting evidence. Auditing is done by the accountant as an auditor to evaluate how well the audit evidence are match to the requirements of conformity and discrepancies to indicate whether the requirements are true, they must be objective, impartial, independent, and competent, the process must be systematically and documented (Mulyadi 2002). Audit is a logical step or procedure to obtain evidence by evaluating its independence which is used as the basis for assessing and conveying the outcome (anaesthesia) which is the process of accounting results. This can be done internally or externally. The audit quality will increase if the public accountant have a better rank. Audit quality is where engineering skills such as audit experience, education, professionalism, audit standard rule structure conducted by an auditor in decision making when submitting an independence violation (Francis 2004). Where the public accountant acting as an auditor has an acknowledgement of experience and expertise in its competence when conducting audits with its independencies. Large audit companies will strive to present greater audit quality compared to small audit firms.

Corporate governance is a series of systems or mechanisms to manage stakeholders expectation and interest. They must comply with the regulations and legislation (Herbert 1971). Corporate governance According to the team of *Badan Pengawas Keuangan and Pembangunan* (BPKP) is a system of control and arrangement of companies that can be seen from the mechanism of relation between various parties that take care of the company, as well as reviewed from the values contained in the mechanism of management itself. Corporate governance is one of the key elements in increasing economic efficiency, which includes a series of relationships between the management of the company, the BOC, the shareholders and other stakeholders, which apply the principles of openness, accountability (accountability), accountability, Independence (independency), and fairness (fairness).

Independent Commissioners are commissioner that are not affiliated with the Board of directors, other members of the Board of Commissioners and controlling stackholders. They are free from any business intention that may affect his or her ability to act independently (Widjaja 2008). Independent Commissioner appointed based on GMS decision of unaffiliated party with the

main shareholder, independent commissioner in the corporate governance guideline of Good (Code of Good corporate governance) should be taken from the Commissioner from outside company. The Independent commissioner is a proportional with the number of shares owned by non-controlling shareholders. The terms are the number of independent commissioners at least 30% of all members of the Commissioner ([Samsul 2006](#)).

High audit quality can be seen from the size of the Public accountant entity, because larger Public accountant entity impact the resource to improve the quality of the audit, so it can affect the earning management ([Dopuch and Pincus 1988](#)). High quality auditors can help improve the quality of financial reporting and reduce the level of profit management activity. Audit quality negatively affects the intensity of profit management, the higher the quality of the audit, the profit management is getting down, the less the tendency of management does profit management then can also improve the company's performance ([Boynton, Johnson et al. 2003](#)).

1.1 Problem formulation

The problem formulation in this study are:

1. Does the quality of audits affect profit management?
2. Is the Commissioner independent of profit management?

1.2 Research objectives

The objectives in this study are:

1. To know the quality of audits on profit management.
2. To know the Independent Commissioner on profit management.

Theoretical foundations

Positive Accounting Theory

PAT with respect to predict actions as a choice of accounting policy by the company manager and how the manager will respond to the proposed new accounting standards. PAT assumes that the company will be organizing themselves in an efficient manner so as to maximize prospects for survival. The company may be viewed as a nexus of contract meaning that its organization can be determined by the contract it is in. The cost of contracts and contracts will appear efficiently. PAT suggests accounting policies will be selected as part of a more efficient company management achievement. PAT does not advise the company should fully explain the accounting policies used. PAT argues that managers are rational and choose accounting policies for the benefit of the company.

The aim of PAT is to understand and predict the choice of managerial accounting policies in different companies. It will appear normative theory. Valuation of the ability of the normative theory to make predictions depends to the extent to which each individual actually takes a decision according to the theory.

Agency Theory

When there is a separation between the principal and the manager (agent) in the company, there is a possibility that the owner's wishes are ignored. When the owner or manager delegates a decision making authority on the other party, there is an agency relationship between the two parties. These agency relationships such as between shareholder relationships and managers, will be effective as long as the manager takes investment decisions

consistent with the interests of shareholders. But when the manager's interests differ from the owner's interests, the decisions taken by the manager will most likely reflect the manager's preference compared to the owner. If, according to what is expressed by agency theory, the selfish manager acts in ways that improve their own welfare at the expense of shareholder profit, then the owner who has delegated the autonomy of decision making on their agents will lose the potential profit that should be generated from a strategy that optimizes the owner's desire ([Leventis and Dimitropoulos 2012](#)).

In general, the owners want to maximize the value of shares. When the manager also has a large number of shares of the company, they will definitely choose a strategy that generates a share value appreciation. However, when more role as a hired person and not as co-owner, then the Manager prefer a strategy that will increase their personal compensation and not a return to the owner ([Pearce and Robinson 2008](#)).

Earning Management

A choice of accounting policies by a manager to increase or decrease the amount of revenue reported with managerial efforts to change, conceal, and suspend information in financial statements by achieving certain objectives ([Sulistyanto 2008](#)).

Reporting intervention in the external financial reporting process with the intention that the user have a wrong picture about the economic performance of the company so that the decision taken by its users in accordance with the expectation of management to increase the value of the company ([Schipper 1989](#)).

Auditing

Auditing is a systematic process to obtain and evaluate the evidence objectively concerning the assertions of activities and economic events, with the aim of establishing the degree of conformity between the assertions and the pre-determined criteria and the delivery of its results to the stakeholders. ([Boynton, Johnson et al. 2003](#)).

Independent commissioner

Independent Commissioner is a Commissioner who does not have an affiliated relationship with the shareholders of the controllers, directors and other commissioners and does not work in a double as other affiliated directors, understands the capital market regulations and elected by minority shareholders. The Independent Commissioner has the fundamental responsibility to encourage the established principles of good Corporate Governance in the company through the empowerment of the Board of Commissioners to be able to perform supervision and giving advice to the board of Directors effectively and provide added value for the company. In an effort to properly carry out its responsibilities, the Independent Commissioner must proactively strive for the Board of Commissioners to supervise and advise the board of directors in relation to, but not limited to the following:

- a. Ensure that the company has an effective business strategy, including monitoring schedules, budgets and the effectiveness of such strategies.
- b. Ensure that the company lifts the executives and professional managers.

- c. Ensure that the company has information, control systems, and audit systems that work well.
- d. Ensure that the company complies with applicable laws and regulations or the company's stipulated values in carrying out its operations.
- e. Ensuring the risk and potential of the crisis is always identified and managed properly.
- f. Ensure the principles and practices of good Corporate Governance are adhered to and implemented properly.

The duties of independent Commissioners as referred to in point 2. f above, among others:

- 1. Ensure transparency and openness of company's financial statements.
- 2. Fair treatment of minority shareholders and other stakeholders.
- 3. It reveals a transaction that contains a fair and fair conflict of interest.
- 4. Compliance with applicable laws and regulations.
- 5. Ensure accountability of the company organs.

II. HYPOTESIS DEVELOPMENT

The influence of independent commissioner on profit management

The term and existence of the new independent Commissioner arose after the issuance of the letter of Bapepam Number: SE03/PM/2000 and Securities registration Regulation Number 339/BEJ/07-2001 date 21 July 2001. According to the provisions of the public company listed on the exchange shall have several members of the Board of Commissioners who qualify as independent commissioner.

In the event that a public company is also required to appoint independent directors and commissioners, it is impartial and not only to comply with the majority of shareholder demand. Independent Commissioners may act for the benefit of the company, with respect to the interests of minority shareholders.

In practice the independence is costly and rare. However, people will turn to the person who raised it and pay it, or at least has submitted it as a member of the Board of directors or the Board of Commissioners, and here the Independent Commissioner in the situation chooses, if he chooses against its index then profit management will not occur, but if the Commissioner is interested

in the same external offer then the legality of future trust will come at the stake (Darmadji 2005).

H1: Independent commissioner negatively affects profit management

The effect of Audit quality on profit management

Quality control standards provide guidance for public accounting offices in conducting the quality control of audit services produced by its offices by complying with various standards published by the Public Accountant Professional Standards Council and the ethics rules of the public Accountant compartment published by the public Accountants compartment, Indonesian Institute of Accountants. In the Professional Services Alliance, the public Accountant Office is responsible for complying with the various relevant standards that have been published by the board and the public accountant compartment. In fulfilling that responsibility, the public Accountant Office must consider the integrity of its staff in establishing its professional relationship, that the public Accountant office and its staff will be independent of its clients. The ethical rules of the public accountant compartment are competent, professional, and objective and will use their professional skills carefully and carefully (due professional care). Therefore, public accountant offices must have a quality control system to provide adequate confidence in the suitability of professional alliance with various relevant standards and regulations.

The Audit on the financial statements compiled under the principles of general accounting, is one among the attest service that can be provided by the Public Accountant office to the public. In recent years, the demand for services by clients, government agencies, and other parties has expanded, not only limited to the audit of historical financial statements, but also includes the service of a public accountant that provides a level of assurance under the level of confidence given by the Auditor in the audit of historical financial statements.

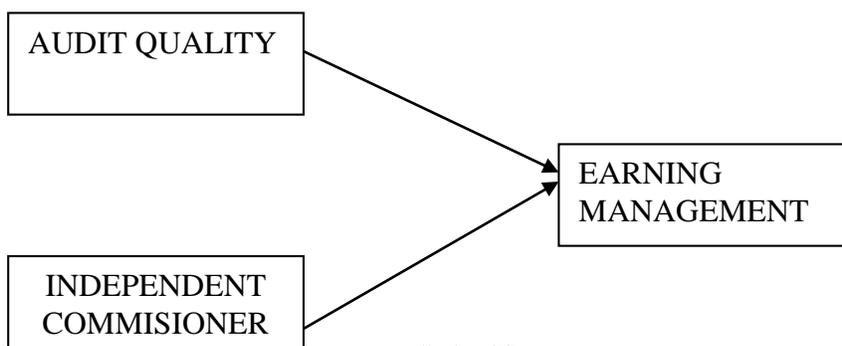
The standard of Atestation was compiled to provide general guidance on all types of Atestment Alliance, which includes examination services, reviews, and procedures agreed upon by management. Inspection services for historical financial statements are specifically arranged by the board through auditing standards. Thus on the basis of the audit quality can not be doubtful and can not be manipulated so that the management that performs profit management can be prevented (Gade 2005).

H2: Audit quality negatively affects profit management.

Research Framework

Independent Variabel

dependent Variabel



Research Method

This research uses a quantitative approach by conducting hypothesis testing. Quantitative research methods can be interpreted as a research method based on the philosophy of positivism, used to research on certain populations or samples, data collection using research instruments, quantitative data analysis or statistics, with the aim of testing a predetermined hypothesis. The purpose of this research is to determine whether there is an influence between deferred tax assets and accruals on corporate profit management. As a bound or dependent variable is profit management and free or independent variables are deferred tax assets and accruals.

III. MEASUREMENT

The operational definitions and variable measurements in this study are:

1. Audit Quality

Audit quality is the existence of auditor appointed by the company. To present the information contained in the financial statements correctly and reliably, the company uses the services of independent auditors as external parties who can provide audit opinions on financial statements presented by the management of the company. The use of this independent auditor will lead to the quality of audit to be provided. One indicator of the quality of the audit is to classify the public Accountant General Four (Deloitte, PriceWaterHouseCoopers, KPMG, Ernst & Young) with the Office of non public accountant Big Four (Darmawan dan Sukartha, 2014). This audit quality variable will be measured with dummy scale :

- 0 = for a company audited by *non big four public accountant*
- 1 = for a company audited by *big four public accountant*

2. Independent Commissioner

The existence of the independent Board of Commissioners is expected to improve supervision so as to prevent the company tax evasion by management. The measurement of independent commissioners in this study uses a percentage of the number of independent Commissioners on the total number of Commissioners in the composition of the company board of Commissioners. The Independent Commissioner's variable will be measured by the percentage of independent Board of Commissioners divided by the total number of the company's board of Commissioners. The independent Board of Commissioners is one who has no affiliation with the Board of directors or the BOC and does not serve as a director of a company related to the owner's company according to the regulations issued by IDX. The Independent Commissioner's calculation is calculated as follows:

$$KOMIND = \frac{\text{Number of independent commissioners}}{\text{The total number of commissioners}}$$

3. Earning Management

Accrual profit management is an action taken either through accounting policy options that have no influence on the cash flow directly with the aim of fulfilling or regulating a specific profit target (Roychowdhury, 2006). Accrual profit management will be

indicated by discretionary accruals and profit aggressiveness. To calculate a single variable of accrual profit management, a factor analysis is performed. Discretionary accrual detection uses a Kothari et al. (2005) model. The Model has a stronger predictor power because it provides additional company performance (return on asset) in the total regression of the accruals (Bustanul et al., 2012). The stages of discretionary accrual measurement with the Kothari et al. (2005) models are as follows.

1. Calculating the total accruals using the cash flow approach, namely:

$$TAit - NIt = CFOit \dots \dots \dots (2)$$

2. Determining the coefficient of total regression of accruals.

A discretionary accrual is the difference between the total accrual (TA) and Nondiscretionary accrual (NDA). The initial step for specifying Nondiscretionary accrual is to perform the following regression:

$$TAit/A^{i,t} = \alpha(1/A^{i,t}) + \beta1((\Delta REVit / A^{i,t}) + \beta2(PPEit/A^{i,t-1}) + \beta3(ROAit) \dots \dots (3)$$

3. Determining *nondiscretionary accrual*.

The regression performed in (2) produces the coefficient of $\beta1$, $\beta2$, and $\beta3$. The coefficient of $\beta1$, $\beta2$, and $\beta3$ is then used to measure nondiscretionary accrual through the following equation:

$$NDAit = \alpha'(1/A^{i,t}) + \beta1'((\Delta REVit - \Delta RECit)/A^{i,t}) + \beta2'(PPEit/A^{i,t-1}) + \beta3'(ROAit) \dots \dots (4)$$

4. Determining *discretionary accrual*.

After a nondiscretionary accrual accrual is obtained, then discretionary accrual can be calculated by reducing the total accruals (calculation result at number 1) with nondiscretionary accrual (calculation result at number 3). Discretionary accruals (DA) or discrete accruals can be counted as follows.

$$DAit = TAit - NDAit \dots \dots \dots (5)$$

Description:

- NIt = Net Income company i for the year t
- $CFOit$ = Cash flow from enterprise operation activity i in period t
- $TAit$ = Total company Accruals i in year t
- $NDAit$ = Nondiscretionary accrual company i for the year t
- $DAit$ = Akruar diskresioner company i for the year t
- $\Delta REVit$ = Changes in company revenue i for the year t
- $\Delta RECit$ = Changes in Receivables i year between t and t-1
- $PPEit$ = PPE level company i for the year t
- $ROAit$ = Net income year t divided by the total asset of the year t-1
- $A^{i,t}$ = Company's total activa i at the end of the year t-1
- α' $\beta1'$ $\beta2'$ $\beta3'$ = the regression coefficient Kothari
- α' $\beta1'$ $\beta2'$ $\beta3'$ = Fitted Coefficient as a result of regression model Kothari

The data

The data used in this quantitative research is the company's audited financial statements for 2017-2018. Data in the form of financial reports and annual reports obtained from the official website of the Indonesia Stock Exchange www.idx.co.id.

Sampling and Population

In this study the population is manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2017-2018 period. Samples taken from the population must be truly representative. The sampling method that will be used in this study is the judgment sampling method, which is one form of purposive sampling by taking a predetermined sample based on the aims and objectives of the study. The criteria used in this study are:

1. Manufacturing companies publish consecutive and complete financial statements during the 2017-2018 period.
2. The manufacturing company publishes financial statements as well as using the Rupiah during the 2017-2018 period.
3. Manufacturing companies publish financial statements as well as the period as of December 31 during the period 2017-2018.
4. Manufacturing companies that have complete data for research during the 2017-2018 period.

Data Analysis

Classical Assumption Test

Forecasting can be done using a regression model. Models with minimal forecasting errors which are good models. Regression model is said to be a good model if the model meets the classical assumptions of free statistics, be it multicollinearity, autocorrelation, normality, and heteroscedasticity.

This research uses multiple linear regression analysis. After that, a multiple linear regression test was carried out using SPSS. The tests that will be carried out are simultaneous test (F test) and Partial test (t test) with a level of significance or probability (α) and a level of confidence or confidence level. The level of significance starts from a maximum of 5% or 0.05.

Regression

Regression testing conducted on the regression equation will be tested on classical assumptions which consist of normality test, heteroscedasticity test, autocorrelation test, and multicollinearity test. The following are the test results from the SPSS:

- a. Data Normality
The Normality data test result as follows

Table 1

Normality test result

Model	Asymp. Sig (2-tailed)	Conclusion
1	0,312	Normally distributed

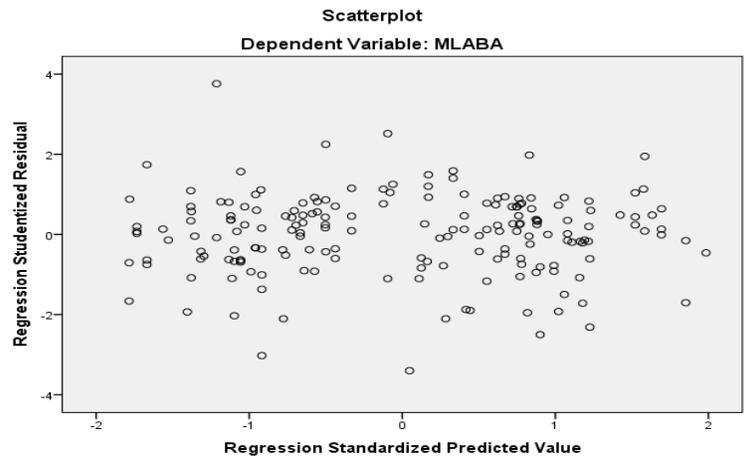
Source: researcher, 2020.

From the classic assumption test table it can be seen that the level of significance of one sample Kolmogorov-Smirnov shows a number above 0.05 so that it can be concluded that the data is normally distributed.

- b. Heteroskedasticity test

From the heteroscedasticity graph (Figure 1) generated from SPSS, it can be seen that the plot graph is between the predicted value of ZPRED and the residual value SRESID. There are no specific patterns, and dotted patterns menyebarkan pada grafik *scatterplot* sehingga dapat disimpulkan tidak terjadi heterokedastisitas.

Figure 1
Scatterplot graph



- c. Autocorrelation test

The autocorrelation test aims to test whether in the linear regression model there is a correlation between the error of the intruder in the t period and the error of the intruder in the t-1 period (before). To find out whether or not there is autocorrelation, you can do a statistical test from Durbin Watson (DW test). To test the presence or absence of autocorrelation, the criteria used if the durbin watson value produced by SPSS is located between -2 to +2, then no autocorrelation occurs. Watson durbin value of this study is 1.693 which means it is in the interval of -2 to +2, then the regression of this study is free from autocorrelation.

- d. Multikolinearity test

Multicollinearity test aims to test whether the regression model found a correlation between independent variables (Ghozali 2011). Multicollinearity can be seen from the value of tolerance and its opponents as well as the variance inflation factor (VIF). Both of these measurements indicate which of each independent variable is explained by other independent variables. From the multicollinearity test table it can be seen that the VIF value for variables is less than 10 for variables in the regression model 1. It was concluded that the regression model 1 does not have multicollinearity between the independent variables in the regression model, because the VIF value <10 and tolerance value > 0.1 are meaning that there is no multicollinearity.

Hypotesis Test

To find out the effect of the independent variables on the dependent variable in the regression model 1, multiple regression analysis will be performed whose results can be seen in the following table.

Table 2
Multiple Regression Results

Variable	Koefisien	Std.Error	t-statistik	Sig.	Conclusion
Constant	0,017	0,223	2,173	0,031	
KOMIND	0,492	0,635	0,076	0,940	Hypothesis rejected
AUDIT	0,017	0,223	-1,571	0,118	Hypothesis rejected
R	0,146	R square	0,021		
F Count	0,987	Sig F	0,416		

Source: Processed, 2020.

Based on the above table, the regression equation is obtained as follows:

$$MProfit = 0,017 + 0,492KOMIND + 0,017AUDIT$$

The explanation of the equation is as follows:

a. The constant (α) of 0.017 indicates that if the independent and control variable variables are 0 (zero), then earnings management will increase by 0.017.

b. The regression coefficient (β_1) for an independent commissioner of 0.017 indicates that if the variable increases by one unit, the value of lana management will increase by 0.017.

c. The regression coefficient (β_4) for audit quality of -0.109 indicates that if the variable increases by one unit, the value of lana management will decrease by 0.109.

d. The coefficient of determination seen from the value of R Square is 2.1%. This shows that 2.1% of the company's earnings management variables can be explained by independent variables, while the rest is explained by other variables not examined in this study. Based on table 5.6 it can be seen that the results of the t test for the independent variable independent commissioners and audit quality have no effect on earnings management, because the significance value is greater than 0.05.

IV. DISCUSSION

Influence of Independent Commissioners on Earnings Management Hypothesis 1 testing in this study is to test whether the proportion of independent commissioners has an effect on earnings management. The results of this study indicate the calculated T value of 0.076 with a significance probability of 0.940 which is above $\alpha = 0.05$ so that it is concluded that the proportion of independent commissioners does not affect earnings management or in other words H1 is rejected.

According to the National Committee on Governance Policy (2006) the board of commissioners has a very important role and role of being a body that carries out supervision and provides advice to directors and ensures that the corporate governance system is run properly. Remembering the role of the board of commissioners is so important, then to maintain integrity and ensuring that the board of commissioners carries out their duties professionally, then there must be an independent commissioner on them. An independent commissioner is a commissioner who is not from an affiliated party or in other words has a business or family relationship with the controlling shares, directors or other board of commissioners.

In accordance with this perspective, it is supported by Bapepam No IA's rules regarding General Provisions for Listing of Securities in the context of good management of listed

companies. - at least 30% (thirty percent) of the total number of commissioners. The results showed a low proportion of independent board of commissioners owned by the sample company. There were even 10 data that showed the company did not have an independent commissioner at all. In addition, the number of independent commissioners is still too small, the average is only around 2 to 3 people and still has not reached 30%. The number of independent directors must be met in order to be able to guarantee effective earnings management oversight mechanisms in accordance with statutory regulations. If it is related to the implementation in Indonesia, the application of independent commissioners can still be said to be quite weak but there are no strict sanctions issued by the regulator as part of the tightening of the implementation of corporate governance.

Effect of Audit Quality on Earnings Management

Testing hypothesis 4 in this study is to test whether audit quality affects earnings management. The results of this study indicate the calculated T value of -1.571 with a significance probability of 0.118 which is above $\alpha = 0.05$ so that it is concluded that audit quality does not affect earnings management or in other words H3 is rejected. The results of this study are in line with the results of previous studies conducted by Christiani and Nugrahanti (2014) and Pambudi and Sumantri (2014).

Audit quality can be interpreted as the auditor's ability to detect material misstatements in the company's financial statements and the auditor's ability to report material misstatements so that the financial statements do not mislead the users of the financial statements. Audit quality is considered as a factor that can improve the quality of financial statements reported by companies so that it is expected to be able to increase investor confidence in the company (De Angelo, 1981; Arens, 2014: 4).

Audit quality can be interpreted as good or not an examination that has been carried out by the auditor. Based on auditing Professional Standards for Public Accountants (SPAP) auditors are said to be qualified, if they meet the provisions or auditing standards. Auditing standards include professional quality, independent auditors, judgment (judgment) used in conducting audits and preparing audit reports. Audit quality is also defined as the level of accountant's ability to understand the client's business. Many factors play a role in this level of capability such as accounting values that can describe a company's economic situation, including the flexibility of using generally accepted accounting principles (GAAP) as a standard rule, the ability to compete competitively as described in financial statements and their relationship to business risk, and etcetera.

There are various types of public accounting firms in Indonesia, usually classified as big four and non big four

Accounting Firms. Big four Accounting Firms (Deloitte, Pricewaterhouse Coopers, KPMG, Ernst & Young) are four Accounting Firms that are not only well-known in Indonesia but are also well-known and of internationally recognized quality. This is because the big four Accounting Firm is more competent in conducting audits and maintaining the reputation and brand name in conducting audits. In addition to recruiting personnel, Accounting Firm big four sets high standards and qualifications so that only potential people can become personnel of Accounting Firm big four. After that, the big four Accounting Firm personnel will be given in-depth training to make their personnel more competent in accounting and auditing.

By looking at the reputation of the big four, there are many public companies that conduct an audit engagement with the big four Accounting Firm. This is not aimed at reducing the existence of earnings management practices within the company but rather towards wanting to increase the credibility of the company's financial statements so that a more reliable financial report will be produced. This view is influenced by the assumption that investors know the big four Accounting Firm big names and their quality so that if the company's financial statements are audited by the big four Accounting Firm it will increase the credibility of the financial statements. This is because investors consider that the company's financial statements that have been audited by the big four Accounting Firm are very reliable.

In addition, other causes that cause audit quality do not affect earnings management are the possibility of earnings management practices occurring within the company because the company wants the company's performance to look good through the company's financial statements in the eyes of investors and potential investors, leaving aside whether the big four or other Accounting Firm which audits the company's financial statements.

V. CONCLUSIONS AND SUGGESTIONS

This study examines the effect of independent commissioner disclosure and audit quality on earnings management. The following is the conclusion of this determination:

1. Independent commissioners have no effect on corporate earnings management. This is because the number of independent commissioners must be met in order to be able to guarantee an effective earnings management monitoring mechanism in accordance with statutory regulations. If it is related to the implementation in Indonesia, the application of independent commissioners can still be said to be quite weak but there are no strict sanctions issued by the regulator as part of the tightening of the implementation of corporate governance.

2. Audit quality does not affect the company's earnings management. Audit quality does not affect earnings management is the possibility of earnings management practices occur within the company because the company wants the company's performance to look good through the company's financial statements in the eyes of investors and prospective investors, by ruling out whether the big four Accounting Firms or other Accounting Firms auditing the company's financial statements.

VI. SUGGESTIONS

The suggestions contributed in this research are:

1. For further research, the use of samples should be expanded beyond the manufacturing sector listed on the Indonesia Stock Exchange, so that the results of the study are able to describe the situation in Indonesia.

2. For further research, can try earnings management indicators other than the modified Jones model, can use measurements with the accrual and real earnings manipulation models, the Kaznik model, and so on.

3. For companies, it is expected that companies in Indonesia will continue to pay attention and consider the actions of corporate earnings management in achieving company effectiveness and efficiency without negative actions or manipulations that are not in accordance with the applicable accounting rules and regulations in Indonesia.

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“EFFECT OF *BASTI CHIKITSA* IN *VATASHTHEELA* (BPH) & *MUTRAKRICHCHHRA* (UTI)”

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ABSTRACT:

The pioneer of the ancient surgery, “*Acharya Sushruta*” defined *Vatashtheela* as “a condition in which the *Apana Vayu* due to vitiation produces mobile, elevated & glandular swelling in between the rectum and urinary bladder (or urethra) which obstructs the passage of urine and faces and produces the symptoms like *Sanga* (obstruction) etc”. whereas, *Mutrakrichchhra* is said to be *Vata Pradhana Tridoshaja Vyadhi* and difficulty in micturition is its characteristic feature. Difficulty may be in the form of *Ruja* (painful micturition), *Daha* (burning micturition), *Muhur-Muhur* (frequent micturition) with *Alpata* (reduced per voiding volume), etc. Therefore, the disease *Vatashtheela* may be correlated closely to BPH (Benign Prostatic Hyperplasia) both surgical anomaly and symptoms wise, whereas, *Mutrakrichchhra* correlate with UTI (sp. Lower Urinary Tract Infections) only symptoms wise. Several drugs in different dosage forms and combinations are tailored, in *Ayurvedic* classics for treating *Vatashtheela* & *Mutrakrichchhra*. Among these, the elected drugs are *Narayana Taila* and *Dashamula Kwatha*. These two drugs were used in combination in the form of *Basti* per rectum.

Randomly selected 15 patients were, treated with *Basti* per rectum, irrespective of their religion, race, occupation, habited etc. In BPH irritative as well as obstructive symptoms like incomplete emptying, intermittency, frequency, weak stream, urgency, staining, nocturia, and in UTI burning micturition, painful micturition, frequency & urgency were observed weekly, during 21 days of treatment period and at interval of 15 days, for 2 months of follow up period after completion of the treatment. A satisfactory positive result was obtained and was statically significant without any adverse effects. Though sample size is small and not enough to prove the efficacy, but author has tried to share her experience through this study to state that

Ayurvedic treatment for *Vatashtheela* & *Mutrakrichchhra* is very effective and improves the quality of life of the patients.

Keywords: *Vatashtheela*, BPH, *Mutrakrichchhra*, UTI, *Narayana Taila*, *Dashamula Kwatha*, *Basti Chikitsa*.

INTRODUCTION:

Sushruta, the pioneer of *Shalya Tantra* (Surgery) had enumerated so many urinary disorders like *Mutrakrichchhra* (UTI), *Mootraghata* (obstruction or suppression of urine), and *Ashmari* (urinary stone) etc. with their management. The concept of *Basti* (urinary bladder), *Mutravaha Srotasa* (urinary system), *Mutrotpatti* (urine formation), and *Shukravaha Srotasa* (reproductive system) are explained by the ancient authors in a concise way.

Urological problems remain a very important part of the medical science which becomes evident from the ancient study. A lot of descriptions is available in *Ayurvedic* classics regarding urological problems under the heading of *Mutraghata*, *Mutrakrichchhra*, *Prameha*, and *Ashmari*. Almost all the urological disorders are covered by these chapters directly or indirectly. Among various *Mutraroga*, *Vatashtheela* (Benign Prostatic Hyperplasia) and *Mutrakrichchhra* (Urinary Tract Infection) is the most common disorder of urinary tract, suffering the mankind very frequently. *Krichchhrata* (painful voiding/difficulty in voiding), is the main feature of *Mutrakrichchhra* but sometimes some feature of *Mutra-vibandhata* (obstructions) is also found. Obstruction is the main feature of *Mutraghata*. *Vatashtheela* & *Mutragranthi* shows obstructive uropathy due to enlarged prostate, based on symptomatology. According to *Acharya Sushruta*, due to vitiation of *Apana Vayu* a *Chala*, *Unnata*, *Ashtheelavata Granthi* is developed in the region between the *Guda* and *Basti*, is called *Vatashtheela*.^[1]

Vatashtheela is one of the types of *Mutraghata* that reveal the symptoms of incomplete voiding, hesitancy, dribbling, nocturia, retention of urine, incontinence of urine, etc. These are chiefly the features related to the Lower Urinary Tract Symptoms (LUTS) that can be correlated closely to BPH (Benign Prostatic Hyperplasia) both surgical anomaly and symptoms wise.

“**Benign**” means “**non malignant**” while hyperplasia means-“**Increase in the number of cells.**” BPH is a part of the normal ageing process and non-cancerous disease. Overall, nearly 80% of elderly men develop BPH. According to several autopsy studies, the histologic prevalence of BPH is approximately 10% for men in their 30 years, 20% for men in their 40 years, reaches 50% - 60% for men in their 60 years, and is 80% - 90% for men in their 70 – 80 years.^[2] During bladder filling (storage), emptying (voiding), and post urination or a

combination, LUTS can occur. Storage symptoms are often irritative and can include frequent urination, urgency, urge incontinence, nocturia, and some kind of pain. In males, voiding symptoms can be correlated to obstructive causes, and thus symptoms such as difficulty in emptying bladder, straining, urinary hesitancy, weak stream or post void dribbling can occur.

There are several potential aetiologies of voiding dysfunction. Common causes of obstructive symptoms include prostatitis or an enlarged prostate due to BPH. Other causes are chronic Cystitis, urethral stricture (scar tissue), bladder stone, Urinary bladder tumour (benign or malignant) etc. From similar aetiologies irritative symptoms may result, including bladder infection. Symptoms can arise if there is neuro-sensory dysregulation in the bladder, that may be reflected as sensory unsteadiness, unwarranted bladder contractions, poor bladder compliance or bladder hyperreflexia.

BPH is a common age-related & slow progressive affliction of males and the management of which is achieved by either conservative or surgical methods. Administration of conservative modern treatment like hormone therapy has side effects like impotence, loss of libido, gynaecomastia, etc. Prostatectomy is a golden treatment for BPH but it is associated with so many complications such as post operative morbidity, retrograde ejaculation, impotence, insomnia, etc. The prostatectomy has also its own complications such as haemorrhage, infection, stricture of bladder neck & urethra, incontinence of urine. However, following surgery, even with the relief of obstruction, not all the patients got relieved from their symptoms.

For a healthy life Good urination habits are important. BPH and Urinary Tract Infection (UTI) is a common distressing and occasionally life threatening condition. BPH occurs in elderly man whereas UTI occurs more often in women than in men, at a ratio of 8:1.^[3]

The *Pratyatma Lakshana* of *Mutrakrichchhra* is “**Dukhen Mutra Pravrittih**”^[4] means discomfort during micturition. UTI may be defined as “a condition in which bacteria enter, persist and multiply within the urinary tract”. *Sushruta* has mentioned that *Pratiloma Gati* of *Vata* or *Kupita Vayu* is responsible for various *Mutra Dosha*^[5] or *Basti Roga*.^[6]

The features of *Doshaja Mutrakrichchhra* described in texts (i.e. *Daha*, *Muhurmutrata*, *Ruja*, *Bastigurutva*, *Shotha*, etc.) resemble more closely to features of LUTI (i.e. burning micturition, painful micturition, suprapubic heaviness, etc.) than Upper Urinary Tract Infections (UUTI) (i.e. flank/abdominal pain, nausea-vomiting, costovertebral angle tenderness, high fever, generalized malaise).

UTI result in 3.6 million hospital visits each year and greater than 100,000 hospital admissions annually.^[7] Up to 50% of women have a UTI at some time of their

life. The prevalence of UTI in women is about 3% at the age of 20, increasing by about 1% in each subsequent decade. In men UTI is uncommon, except in the first year of life and in males over 60, in whom urinary tract obstruction is due to prostatic hypertrophy may occurs.

The treatment of UTI in modern medicines via antimicrobial therapies having adverse effect and bacterial resistance to anti-microbial agents has been emerging and rapidly disseminating among many nosocomial and community acquired pathogens is another point of concern.

According to *Ayurvedic* classics, *Vata* is the root cause of all the varieties of *Mutraghata* (including *Vatashtheela*) and *Mutrakrichchhra*. *Basti* mentioned in *Ayurvedic* classics, which is the treatment of choice in *Vata* pre-dominant diseases. Therefore, *Basti Chikitsa* covers “**Half of the treatment of all the diseases**” and *Basti* has been defined by *Acharya Charaka* as “*Chikitsa-ardhamiti*” [8]

Acharya Sushruta classified diseases into two groups – one which are cured by surgical procedure (*Shastra Saadhya*) and the second ones which are cured by the use of therapies like *Snehaadi*. But having classified this way they are not exclusive of each other that means in *Shastra Saadhya* diseases we can use the therapies like *Snehaadi* whereas in *Snehaadi Saadhya* diseases we cannot use *Shastra karma* (surgical procedures) [9].

As per the *Samprapti* of *Vatashtheela* and *Mutrakrichchhra*, there is deranged function of *Vata Dosh*a, esp. *Apana Vayu* with the vitiation of other *dosha*. So, the line of treatment is instituted as *Vatahara*, *Mutrala*, *Bastishodhaka*, *Shothahara*, *Krimighna*, and *Lekhana*, etc. to achieve the goal of desired treatment. Therefore, in this study *Basti Chikitsa* are elected for the treatment of *Vatashtheela* & *Mutrakrichchhra*.

In this research work an attempt was taken to evaluate an *Ayurvedic* non-invasive therapy in the management of the disease *Vatashtheela* (BPH) & *Mutrakrichchhra* (UTI) according to the treatment principles given in *Ayurvedic* texts. Also, the work was aimed to assess its safety & efficacy of the therapy by adopting advanced scientific parameters and to evaluate the changes in maximum urine flow rate (Qmax), PVRU and prostate size (by uroflowmetry and USG whole abdomen).

BASTI CHIKITSA

General Consideration – The classical literature had given a countless significance to *Basti Chikitsa* and points out a varied range of its applicability. According to the principle of *Ayurveda* it is a pioneer method of treatment for the correction of vitiated *Dosha*. *Acharya Sushruta* & others (*Su.Chi.35/14-16*; *A.H.Su.19/1*) had described that all those drugs or medicaments which are introduced through rectum by the help of *Basti* (bladder) are designated

as “**Basti Karma**”. Though in generic sense, the term ‘**Basti**’ is applied for all kind of *Basti* modalities as *Niruha Basti*, *Anuvasana Basti*, *Uttara Basti* and *Shirobasti* etc.

Moreover, *Vayu* is responsible for the formation, communication, and spread of *Sweda*, *Mala*, *Mutra*, *Kapha*, and other biological substances in the body. *Acharya Vagbhata* mentioned (in *A.S.*) that when *Basti* is administered, it acted on the *Apana Vata* which takes the *Virya* of the *Dravya* upwards and it is then taken over by *Samana Vata*, then by *Vyana Vata* which will circulate it to the whole body and further it is moved in upward direction by *Prana Vata*. Thus, it will act in the whole body and will cure almost all the diseases.

Basti is the principal treatment for *Vatika* disorder. According to *Acharya Charaka* there is no cause greater than *Vata* in the manifestation of the disease and there is no better remedy, other than *Basti*. Hence he has mentioned in *Agraya Sangraha* that “**Bastistantranam**”.^[10] *Sushruta* says *Basti* is useful in treatment of *Vata*, *Pitta* and *Kapha Doshas* and even in the derangement of *Rakta Dhatu*. It is also effective in combination of two *Doshas* or all the three *Doshas* [*Su.Chi.35/6*].

Basti is a type of treatment modality that has got both *Shodhana* & *Sanshamana* action depending on the drugs used. *Basti* in different form has a wide range of application such as restoration of *Virya* (semen), anabolism in emaciated person, *Karshan* in obese person, improvement of vision, prevention of aging, improvement in lustre, strength & healthful longevity. *Basti* eradicates morbid *Vata* from the root along with other *Dosha* & in addition it gives nutrients to the body tissues (*A.S.Su.28/3*). Therefore, *Basti Chikitsa* covers “**Half of the treatment of all the diseases**” (*Ch.Si.1/39* & *Su.Sh.8/23*) and supposed to be the principle (specific) treatment for *Vatika* Disorders (*A.H.Su.1/25*), while some authors consider it as the complete remedy for all the ailments.

Acharya Charaka regarding urinary system mentioned this *Basti Chikitsa* for the treatment of *Mutrakrichchhra* (dysuria) and *Mutrasanga* (retention of urine) [*Ch.Si.2/16*]. Whereas, *Acharya Sushruta* had indicated *Basti Chikitsa* in the management of *Mutrakrichchhra*, *Ashmari*, *Shankarajanya Shula*, and *Vata-Mutra- Mala avarodha*, etc. [*Su.Chi.35/5*].

It can be inferred from above description that *Basti* proves to be effective and first line of treatment of *Vatika* disorders including *Mutrarogas*.

MATERIAL AND METHODS

AIMS & OBJECTIVES :

- To evaluate the efficacy of *Basti Chikitsa (Narayana Taila and Dashamula Kwatha)* in the management of *Vatashtheela* (BPH) & *Mutrakrichchhra* (UTI).
- To find out any adverse effect of the treatment (drug), if any, during the therapy and follow up.

SELECTION OF PATIENTS :

The Patients with signs and symptoms of *Vatashtheela & Mutrakrichchhra* which were fulfilling the clinical criteria of diagnosis were randomly selected and registered irrespective of their gender, religion, occupation, education, etc. from O.P.D and I.P.D of P.G Department of Shalya Tantra, Rishikul Ayurvedic College and Hospital, Uttarakhand Ayurved University, Haridwar [U.K] India. Total 15 patients were selected for the clinical study. A Specially Designed Research Proforma was prepared for this study and informed written consent of the patient was taken before starting the treatment.

SAMPLING METHODE:

A total number of 15 patients with signs and symptoms of *Vatashtheela* (BPH) and *Mutrakrichchhra* (UTI) were enrolled.

INCLUSION CRITERIA:

- Age - Above 20 years.
- Sex - Either sex, males for *Vatashtheela*.
- Patients with clinical signs & symptoms of *Vatashtheela & Mutrakrichchhra*.

EXCLUSION CRITERIA:

- Age below 20 yrs.
- Patient with acute retention.
- Malignant condition of Urogenital system.
- Patient associated with other systemic disorders like Diabetes mellitus, Renal failure, Malignancy etc.
- Patient not willing to undergo trial.

METHOD OF RESEARCH

Table No.1: Study Design:

No. of Patients	Formulation	Dose	Route	Time	Duration
15	<i>Narayana Taila</i> & <i>Dashamula Kwatha</i>	<i>Kwatha</i> 200ml/60ml alternate day + <i>Taila</i> - 20ml per day	<i>Basti</i> per rectum	In morning hours	For 21 days

CRITERIA FOR DIAGNOSIS:

Diagnosis was made on the basis of history, clinical signs & symptoms of *Vatashtheela* (BPH) & *Mutrakrichchhra* (UTI), examinations (general, systemic & per rectal) and investigations.

INVESTIGATIONS:

1. Blood Examination: -

- Hb, T.L.C., D.L.C., E.S.R. Blood sugar (RBS, FBS, PP), S/Bilirubin, H.I.V, HbSAg to assess the general condition of patients.
- Blood urea and Serum creatinine to assess the functional status of urinary system.
- Serum acid phosphates, Serum alkaline phosphates and Serum prostate specific antigen (PSA) to exclude the possibility of carcinomatic conditions of prostate.

2. Urine examination.

4. Ultrasonography (USG) of whole abdomen to see the enlargement of prostate (to know size/volume/weight/post voided residual urine).

5. Urodynamics Evaluation by Uroflowmeter.

PREPARATION OF TRIAL DRUGS:

The trial drug *Narayana Taila* was prepared in **Hans Herbals Pvt. Ltd., Sidcul, Haridwar, UK** under our supervision as per "*Sneha Paka Kalpana*" and *Dashamula Kwatha* was self-prepared daily as per the "*Kwatha Kalpana*" mentioned in classical texts.

Storage of Narayana Taila: The prepared *Narayana Taila* was filtered and preserved in airtight glass bottles.

BASTI PROCEDURE

POORVA KARMA:

- The treatment with *Basti* procedure was explained to all the patients and a **written informed consent** was taken before starting the procedure.
- Patient was advised to go through the natural urges in the morning and to take a light Breakfast before *Basti* in the morning hours.
- *Basti* materials such as prepared *Narayana Taila*, *Dashamula Kwatha*, sterilized Rubber catheter & Syringe (50/60cc), Gloves & Gauze pieces etc. were kept ready before the application, then after patient had been asked to lie down on the table in left lateral position.

PRADHANA KARMA:

Position –

- In the classics, the position that must be followed is left lateral. *Charaka* has given explanation that *Grahani* and *Guda* are coming in the same direction. Therefore, one must follow the same position.^[11]
- Logical thinking says that only in the left lateral position due to the gravitation the drugs may enter into the colon. In the medial side, the middle rectal valve is there which controls the sphincter continence which may get injured when the enema is given in the right lateral position.
- Left lateral position (i.e. with extended left lower limb, flexed right knee & hip towards chest, on a comfortable table or bed. Perianal area was exposed.

Procedure ^[12] –

- First of all, *Dashamula Kwatha* was prepared as per *Kwatha Kalpana Vidhi*. After that, 20ml *Narayana Taila* (every day) and 200ml/60ml (in alternate day i.e. 200ml in first day, 60ml in second day, 200ml in third day and so on ...) lukewarm *Dashamula Kwatha* was taken in a bowl/container and mixed well to form a colloidal mixture, now with the help of 50/60 ml sterile syringe, the nozzle of which was connected with plain rubber catheter no. 8.
- Now, the tip of the rubber catheter was lubricated by oil. Gently the tip of the rubber tube was introduced into the anal orifice for about four *Angula Pramana* (10 cms). Patient was asked to be in relaxed state and then slowly medicament was pushed into the rectum by avoiding entry of air in a slow steady manner.

- Then slowly the catheter was withdrawn with little quantity of medicament remaining inside the syringe. Then patient was advised to lie down in supine position, keeping pillow below buttock, and a gentle tap given over the buttocks. Further the patient was instructed to lie down in supine position for a while.

PASCHATA KARMA:

- After given *Basti*, the patient was instructed to lie down in the left lateral position or in prone position for 10-30 minutes and to hold the *Basti* material as possible. As the patient gets urge for defecation, patient could pass the stool.
- During the course of treatment patient was advised to have *Laghu & Ushna Ahara* on the same day evening and to avoid *Sheet* (to cold), *Vidaahi* (causing burning sensation), *Vishtambhi* (slow movement in G.I. tract), *Ruksha* (too dry & causes aggravation of *Vata*).

CRITERIA FOR GRADING & ASSESSMENT

1. ON SUBJECTIVE PARAMETERS:

Table No.2: Symptom Score According to IPSS (International Prostate Symptom Score) In BPH:

S. No.	Symptoms	Grading	BT	D7	D14	D21
1.	Feeling of incomplete bladder emptying	0 = Not at all 1 = One or less than one 2 = Less than half the time 3 = About half time 4 = More than half time 5 = Almost always				
2.	Frequency of urination (in daytime)	0 = Not at all 1 = One or less than one 2 = Less than half the time 3 = About half time 4 = More than half time 5 = Almost always				
3.	Intermittency of urine stream	0 = Not at all 1 = One or less than one 2 = Less than half the time				

		3 = About half time 4 = More than half time 5 = Almost always				
4.	Urgency of urination	0 = Not at all 1 = One or less than one 2 = Less than half the time 3 = About half time 4 = More than half time 5 = Almost always				
5.	Weak stream	0 = Not at all 1 = One or less than one 2 = Less than half the time 3 = About half time 4 = More than half time 5 = Almost always				
6.	Straining	0 = Not at all 1 = One or less than one 2 = Less than half the time 3 = About half time 4 = More than half time 5 = Almost always				
7.	Nocturia (frequency of urination in night)	0 = Not at all 1 = One time / night 2 = Two time / night 3 = Three time / night 4 = Four time / night 5 = five time or more / night				
	TOTAL SCORE (Out of 35)	1-7 = Mild 8-19 = Moderate 20-35 = Severe				

Table No.3: Scoring Pattern of UTI:

S. No.	Symptoms	Grading	BT	D7	D14	D21
1.	Burning micturition	0 = Burning absent 1 = Mild burning 2 = Moderate burning 3 = Severe burning				
2.	Painful micturition*ADL = Activities of daily life	0 = No pain 1 = Mild pain (nagging, annoying, interfering little with ADLs) 2 = Moderate pain (interferes significantly with ADLs) 3 = Severe pain (disabling, unable to perform ADLs)				
3.	Frequency of micturition	0 = 5-7 times 1 = 8-10 times 2 = 11-13 times 3 = More than 13 times				
4.	Urgency	0 = Absent 1 = Urgency but under control 2 = Urgency difficult to control 3 = Beyond control, even passes few drops of urine				

Table No.4: Grading Based on Total Score of IPSS (Maximum Score 35):

Grade	Symptom Score	Severity
G ₀	00	Not at all
G ₁	1 – 7	Mild
G ₂	8 – 19	Moderate
G ₃	20 – 35	Severe

2. ON OBJECTIVE PARAMETER:

a). Uroflowmetry (Qmax -maximum flow rate):

1. Gr 0: Qmax = > 15 ml / sec
2. Gr 1: Qmax = 13-15 ml / sec
3. Gr 2: Qmax = 10-12 ml / sec
4. Gr 3: Qmax = 7-9 ml / sec
5. Gr 4: Qmax = < 7 ml / sec

b). Ultrasonography (USG) whole Abd.: for weight/size/post voided residual urine and PVRU.

ASSESSMENT: The overall effect of the therapy was assessed by the patients sign and symptoms according to subjective & objective parameters. Assessment was done on every 7 days during 21 days of treatment period.

DURATION OF THERAPY: The duration of therapy was 21 Days.

FOLLOW UP: Cases were follow up at interval of 15 days, for a period of 2 months after completion of therapy.

STATISTICAL ANALYSIS

The Parameters of assessment was graded and statistically analysed.

1. **STATISTICAL TEST:** All information which were based on subjective and objective parameters were gathered and statistical analysis was done in the form of Mean (X), Standard deviation (S.D.), Standard error (S.E.), and Friedman's test.
2. **RESULT INTERPRETATION:** The obtained results were interpreted as follow –
 - If $p > 0.05$ - Not significant (NS).
 - If $p = 0.01$ to 0.05 - Significant (S)
 - If $p \leq 0.001$ - Highly significant (HS)

PRESENTATION OF DATA:

All collected clinical data was compiled and presented as –

- General observations.
- Effect of therapy on subjective and objective parameters.
- Overall effect of therapy.

RESULT

EFFECT OF THERAPY ON SUBJECTIVE PARAMETERS

VATASHTHEELA (BPH):

In this present research work total 15 patients were enrolled, out of which all the patients had completed this clinical trial and results are statistically analysed.

Since observations are on ordinal scale (gradations), we have used “Friedman’s test” to test efficacy at each follow up.

Table No.5: Effect of Therapy on Incomplete Bladder Emptying:

Incomplete bladder emptying	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.67	0.98	3.87	00	41.279	3.00	0.001
Day 7	15	1.80	0.77	2.63	32.50			
Day 14	15	1.60	0.51	2.43	40.00			
Day 21	15	0.40	0.51	1.07	85.00			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.6: Effect of Therapy on Frequency of Urination:

Frequency of Urination	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.60	1.06	3.87	00.00	42.248	3.00	0.001
Day 7	15	1.73	0.88	2.70	33.33			
Day 14	15	1.47	0.52	2.43	43.59			
Day 21	15	0.33	0.49	1.00	87.18			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.7: Effect of Therapy on Intermittency of Urine Stream:

Intermittency of Urine Stream	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.27	1.22	3.70	00.00	38.700	3.00	0.001
Day 7	15	1.53	0.92	2.70	32.35			
Day 14	15	1.33	0.62	2.50	41.18			
Day 21	15	0.27	0.46	1.10	88.24			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.8: Effect of Therapy on Urgency of Urination:

Urgency of Urination	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.80	0.86	3.93	00.00	43.267	3.00	0.000
Day 7	15	1.87	0.74	2.63	33.33			
Day 14	15	1.67	0.49	2.43	40.48			
Day 21	15	0.33	0.49	1.00	88.10			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.9: Effect of Therapy on Weak Stream:

Weak Stream	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.13	1.36	3.60	00.00	36.193	3.00	0.001
Day 7	15	1.47	0.99	2.63	31.25			
Day 14	15	1.40	0.83	2.57	34.38			
Day 21	15	0.27	0.46	1.20	87.50			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.10: Effect of Therapy on Straining:

Straining	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.93	0.80	4.00	00.00	44.431	3.00	0.000
Day 7	15	1.93	0.80	2.57	34.09			
Day 14	15	1.80	0.56	2.43	38.64			
Day 21	15	0.40	0.63	1.00	86.36			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.11: Effect of Therapy on Nocturia:

Nocturia	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	1.80	1.15	3.53	00.00	34.223	3.00	0.001
Day 7	15	1.20	0.77	2.63	33.33			
Day 14	15	1.13	0.64	2.57	37.04			
Day 21	15	0.20	0.41	1.27	88.89			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.12: Effect of Therapy on Total IPSS Score:

Total IPSS Score	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	17.20	2.70	4.00	00.00	45.000	3.00	0.001
Day 7	15	12.20	1.90	3.00	29.07			
Day 14	15	8.87	1.36	2.00	48.45			
Day 21	15	2.20	1.47	1.00	87.21			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

MUTRAKRICHCHHRA (UTI):

Table No.13: Effect of Therapy on Burning Micturition:

Burning Micturition	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	1.80	0.41	3.87	00.00	37.576	3.00	0.000
Day 7	15	1.00	0.00	2.53	44.44			
Day 14	15	0.87	0.35	2.27	51.85			
Day 21	15	0.27	0.46	1.33	85.19			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.14: Effect of Therapy on Painful Micturition:

Painful Micturition	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	1.80	0.41	3.80	00.00	39.000	3.00	0.001
Day 7	15	1.00	0.00	2.50	44.44			
Day 14	15	1.00	0.00	2.50	44.44			
Day 21	15	0.20	0.41	1.20	88.89			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.15: Effect of Therapy on Frequency of Urination:

Frequency of Urination	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	1.67	0.90	3.50	00.00	38.000	3.00	0.001
Day 7	15	1.13	0.52	2.70	32.00			
Day 14	15	1.13	0.52	2.70	32.00			
Day 21	15	0.20	0.41	1.10	88.00			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

Table No.16: Effect of Therapy on Urgency:

Urgency	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	1.93	0.80	3.67	00.00	39.821	3.00	0.000
Day 7	15	1.27	0.46	2.63	34.48			
Day 14	15	1.27	0.46	2.63	34.48			
Day 21	15	0.20	0.41	1.07	89.66			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

EFFECT OF THERAPY ON OBJECTIVE PARAMETERS:

Table No.17: Effect of Therapy on Uroflowmetry (Qmax):

Uroflowmetry (Qmax)	N	Mean	SD		% Effect	Friedman's Test	df	P value
BT	15	2.13	1.19	3.67	00.00	34.698	3.00	0.001
Day 7	15	1.40	0.83	2.53	34.38			
Day 14	15	1.33	0.72	2.47	37.50			
Day 21	15	0.27	0.46	1.33	87.50			

From above Table we can observe that p-values is less than 0.05. Hence, we conclude that effect observed is significant.

❖ **The Clinical trial of *Basti Chikitsa* depicted Highly significant ($P \leq 0.001$) results over all the mentioned symptoms / parameters.**

OVERALL EFFECT OF THERAPY

Table No.18: Overall Effect of Therapy:

Effect of Therapy	No. of Patients	% Effect
Complete Cured	1	6.66%
Marked Improvement	8	53.33%
Moderate Improvement	5	33.33%
Mild Improvement	1	6.66%
Unchanged	0	0.00%

Further, it is observed that 1 (6.66%) patient is completely cured, 8 (53.33%) patients were revealed marked improvement, 5 (33.33%) patients shown moderate improvement and 1 (6.66%) patient shown mild improvement. Whereas, none of the patients belong to unchanged.

DISCUSSION

ON SUBJECTIVE PARAMETERS OF VATASHTHEELA (BPH):

1. Effect on Incomplete Bladder Emptying:

- The mean score of Incomplete bladders emptying was 3.87 (BT) which was reduced to 1.07 after therapy with 85% relief, and p-value is 0.001 which is statistically highly significant.
- As we known the *Vata dosha* is the prime cause for the disease *Vatashtheela & Basti Chikitsa* is the best treatment for *Vatika* disorders. So, from the above data it is clear that *Basti Chikitsa* having the potency to pacify the vitiated *Vata dosha* and improved the bladder function by increasing its tone as well as reducing the size of the prostate.
- Ultimately the bladder outflow obstruction (BOO) was improved that's why improvement in incomplete bladder emptying was found.

2. Effect on Frequency of Urination:

- The mean score of Frequency of Urination was 3.87 (BT) which was reduced to 1.00 after therapy with 87.18% relief, and p-value is 0.001 which is statistically highly significant.
- In BPH, hypertrophy of urinary bladder muscles occurs, and bladder tone affected that's why small amount of urine result as urge for urination that leads to frequency of urination. Since *Basti Chikitsa* having the potency to pacify vitiated *Vata* (esp. *Apana Vayu*) as well as properties like *Balya*, *Rasayana*, *Shothahara*, *Krimihara* etc. of the formulated *Basti* drugs, are helpful to improve the function of Detrusor muscles of bladder and also reducing the prostate size. Therefore, encouraging effect of therapy was found on Frequency of Urination.

3. Effect on Intermittency of Urine Stream:

- The mean score of Intermittency of Urine Stream was 3.70 (BT) which was reduced to 1.10 after therapy with 88.24% relief, and p-value is 0.001 which is statistically highly significant.

- Intermittency shows that the weak bladder muscle which is unable to completely evacuate bladder in a single flow of urine due to stasis, inflammation, straining & narrowing of the urethra.
- The effect of *Basti Chikitsa* was seen on *Vata dosha* and the drugs used for *Basti* shows the properties such as *Mutrala*, *Vata-shamaka*, *Bastishodhaka*, *Balya*, *Shothahara* etc. which have the potency to provide strength to the *Basti-Snayu* and improve the function of bladder which lead to easy release of urine from *Basti* (bladder) without much effort.

4. Effect on Urgency of Urination:

- The mean score of Urgency of Urination was 3.93 (BT) which was reduced to 1.00 after therapy with 88.10% relief, and p-value is < 0.001 which is statistically highly significant.
- As the internal sphincter function is deranged due to prostatic invasion into the bladder that leads to escape of small amount of urine into the prostatic urethra. So, there is an intense urge to excrete this urine immediately which is called urgency (*Muhurmutrata*). Since formulated drugs used as *Basti Chikitsa* having *Shothahara* property, it reduces the size of prostate, that's why there is no invasion of prostate into the bladder and decrease in this irritative symptoms will indicate relief in *Vatashtheela* (BPH).

5. Effect on Weak Stream:

- The mean score of Weak Stream was 3.60 (BT) which was reduced to 1.20 after therapy with 87.50% relief, and p-value is 0.001 which is statistically highly significant.
- At this time micturition is probably due to vesical introversion of the sensitive prostatic mucosa because of intravesical enlargement of the prostate due to its (prostate) enlargement, elongation of prostatic urethra occurs & its calibre decreases. This alteration in urethra induces weak urine stream.
- So, reduction in this symptom reveal that *Basti Chikitsa* having the potency to reduce the root causes of this symptom.

6. Effect on Straining:

- The mean score of Straining was 4.00 (BT) which was reduced to 1.00 after therapy with 86.36% relief, and p-value is < 0.001 which is statistically highly significant.
- In the case of BPH, the resistance of the bladder outlet increases and the calibre of prostatic urethra decreases, so that patients with BPH strains during micturition will completely empty their bladder.

- The % relief in this symptom show that the *Basti Chikitsa* having the capability to decrease the bladder outlet resistance & enhance the calibre of urethra by reducing the size of prostate gland and other causes which are responsible for this symptom.

7. Effect on Nocturia:

- The mean score of Nocturia was 3.53 (BT) which was reduced to 1.27 after therapy with 88.89% relief, and p-value is 0.001 which is statistically highly significant.
- The *Vatashtheela* (BPH) patients commonly complains the most irritative symptom nocturia due to predominance of *Apana Vayu*.
- *Vata dosha* continues to generate unnecessary contractions of bladder, in which some amount of urine & *Shotha* already exists. Collectively, they generate nocturia. *Basti Chikitsa* pacify *Vata dosha* & *Shotha* of bladder. So, patient comes to ease.

8. Effect on Total IPSS:

- The mean score of Total IPSS was 4.00 (BT) which was reduced to 1.00 after therapy with 87.21% relief, and p-value is 0.001 which is statistically highly significant.
- Above data reflects that *Basti Chikitsa* is very effective in reducing all the 7 LUTS which is included in IPSS.

ON SUBJECTIVE PARAMETERS OF MUTRAKRICHCHHRA (UTI):

9. Effect on Burning Micturition:

- The mean score of Burning Micturition was 3.87 (BT) which was reduced to 1.33 after therapy with 85.19% relief, and p-value is < 0.001 which is statistically highly significant.
- This symptom is especially due to vitiation of *Pitta dosha* (as we know *Pitta dosha* is responsible for *Daha* i.e. burning) along with *Vata dosha*. *Basti Chikitsa* pacify *Vata* and *Pitta dosha* and formulated drugs used for *Basti Chikitsa* having *Mutrala*, *Bastishodhaka*, *Sheetal*, *Dahashamaka*, *Krimighna*, *Shothahara* & *V-P Shamaka* etc. properties which reduces the burning micturition effectively. So, patients got relief in this symptom of *Mutrakrichchhra* (UTI).

10. Effect on Painful Micturition:

- The mean score of Painful Micturition was 3.80 (BT) which was reduced to 1.20 after therapy with 88.89% relief, and p-value is 0.001 which is statistically highly significant.
- As we know that existence of pain is due to *Vata dosha* and *Prakrita Mutra* is considered as *Avedanam*, which is achieved by *Basti Chikitsa* because they are

Vatahara & Shulahara. The formulated drugs used in this therapy also removes *Mutravaha Srotodushti* from tissue level, pacifies *Doshas*, improves *Agni*, and brings *Prakritavastha*. It also has analgesic properties.

11. Effect on Frequency of Micturition:

- The mean score of Frequency of Micturition was 3.50 (BT) which was reduced to 1.10 after therapy with 88% relief, and p-value is 0.001 which is statistically highly significant.
- Since undue contractions of bladder is the *Karma* of *Prakupita Vata* that have been stopped by *Basti Chikitsa* by its *Vatahara* property. Thus, the urinary bladder performs *Samyaka Mutradharana* and patients got relief from this symptom.

12. Effect on urgency:

- The mean score of Urgency was 3.67 (BT) which was reduced to 1.07 after therapy with 89.66% relief, and p-value is < 0.001 which is statistically highly significant.
- All the discomfort in LUTIs are due to *Apakwa Mutra*. *Aama Mutrata* and *Shotha* in urinary tract (i.e. *Mutravaha Srotasa*) leads to irritation of urinary bladder and urination. Therefore, there is an intense urge to excrete the *Aama Mutra* immediately that is termed as Urgency. *Basti Chikitsa* pacify *Vata dosha* and by its *Shothahara*, *Agnidipana*, *Bastishodhaka* etc. properties of formulated drugs remove *Aama Mutra* and *Shotha*. That's why patients got relief in this symptom.

DISCUSSION ON OBJECTIVE PARAMETERS:

13. Effect on Maximum Flow Rate (Qmax):

- The mean score of Uroflowmetry (Qmax) was 3.67 (BT) which was reduced to 1.33 after therapy with 87.50% relief, and p-value is 0.001 which is statistically highly significant.
- Abnormal flow may be due to obstruction (of any aetiology) or detrusor hypo contractibility. Improvement in the Qmax is obviously due to improved force of urine flow. This may be either due to increased bladder contractibility or decreased resistance to the flow of urine in the urethra.

14. Effect on Prostate Size / Volume:

All the 15 patients which were enrolled in this research work had completed this clinical trial, out of which we have got only 07 USG reports after completion of treatment. These reports show, outstanding response of therapy on the prostate size (volume) as well as on PVRU.

On the basis of these some USG reports, we have concluded that the treatment used in this study definitely reduces the Prostate size & PVRU. But unfortunately, due to lack of USG reports of all 15 patients that completed this clinical trial, we can't show its result statistically.

CONCLUSION

- ❖ The elected formulations for clinical trial i.e. *Basti Chikitsa (Narayana Taila + Dashamula Kwatha)* had shown *Tridosha Shamaka* (esp. *Vata-Kapha shamaka*) action and *Dipana, Pachana, Lekhana, Bastishodhaka, Balya, Shothahara, Mutrala, Krimighna, Rasayana, Ojovardhaka* etc. properties and may be held responsible for breaking the *Samprapti of Vatashtheela (BPH)* and *Mutrakrichchhra (UTI)* as well as correction in imbalanced level of sex hormones and improving bladder functions by improving bladder muscle tone.
- ❖ There was no any untoward effect or adverse drug reaction (ADR) and recurrence recorded during treatment & follow up among all the patients and it is clinically proven as a safe and effective therapy.
- ❖ In this research work, it was noted that the patients which was suffering from *Vatashtheela (BPH)* in their early age of life, showed better response to this therapy as compare to advanced aged patients.

Thus, it can conclude that *Basti Chikitsa* can be used as a successful conservative treatment modality in the patients suffering from *Vatashtheela (BPH)* & *Mutrakrichchhra (UTI)*.

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Factors Affecting High Accident Rate of Labors in Manufacturing Sector, Central Province, Sri Lanka

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Abstract- An unfortunate incident which is unexpected and unintentional tropically resulting in damage or injury can simply define as an accident. Most of organizations are aiming at reducing the workplace accidents in order to create a healthy working setting which is very safe. In any organization, there can be various factors affected to the workplace accidents. This study focuses on exploring the factors affecting high accident rate amongst laborer category in manufacturing sector, Central Province, Sri Lanka. One of main objective is to find & reveal the relationship and impact between safety training, working condition, job stress and rate of workplace accidents among operational level employees at manufacturing sector in Central Province, Sri Lanka. The study was conducted in coverage of 136 sample which was made using simple random sampling technique out of 210 population of operational level employees in selected manufacturing firms. Rate of workplace accidents of operational level employees was identified as a dependent variable while the safety training, working condition and job stress were identified as interdependent variables. Analysis of collected quantitative data was done using SPSS Data Analyzing Package. As Findings of the study, Safety trainings and working conditions provided to employees would not correlated with the rate of accidents happened in the organization in a sufficient way while job stress had made a considerable correlation as well as an impact on the rate of accidents of employees. Finally, researchers have explored that job stress would be the most affective factor, out of selected factors, which lead to workplace accidents for this study and there may be several other factors which would lead to work place accidents.

Index Terms- Accident rates, Safety training, Working conditions, Job stress, Manufacturing Sector

I. INTRODUCTION

The success of an organization depends on the standard performance of its labor force. Undoubtedly the labor force must be healthy, strong and above all free of accidents. This ensures the smooth performance of the organization. An unfortunate incident which is unexpected and unintentional tropically resulting in damage or injury can simply defined as an accident. All the organizations are aiming at reducing the workplace accidents and to create a healthy work setting which is safe. There is a main cause which can be affected to the workplace accidents. That is an immediate cause or basic cause; the immediate cause is directly making the accident and it composed with unsafe acts such as inappropriate act or behavior of a worker and on the other side, unsafe conditions within an organization such as dangerous equipment, facilities machines and tools that are workers having risk when they are dealing with (González et al, 2016). The statistics of the worldwide labor organization shows that (2020) in its report of the day of worldwide occupational safety and health, “Approximately 4% of the worldwide Gross National Product (GNP) is lost due to the costs of losses, deaths and illnesses, resulting in work absences, treatments and payments due to disability or death” (González et al, 2016).

This study focuses on exploring the factors affecting high accident rate amongst laborer category in manufacturing organizations, Central Province, Sri Lanka. The main objective of this study is to find & reveal the relationship and impact between safety training, working condition, job stress and rate of workplace accidents among operational level employees at manufacturing organizations in Central Province, Sri Lanka. The research questions of this study as follows;

- I. What is the relationship between safety training and workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?
- II. What is the relationship between job related stress and workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?
- III. What is the relationship between working conditions and workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?
- IV. What is the impact of safety training, job stress, working conditions on workplace accidents of operational level employees in manufacturing sector, Central Province, Sri Lanka?

Most of Sri Lankan manufacturing level organizations suffer from various losses due to workplace accidents. Continuous accidents of operational employees are a cost and a risk to the organization. The study findings will be presented to be expected manufacturing

sector to identify the major causes for the workplace accidents of operational level employees and they can be conversant with the best safety strategies to manage high workplace accident rates.

II. LITERATURE REVIEW

The Domino Theory

This theory was introduced by W.H. Heinrich in 1931. According to him, the accident is a result of a series of predisposed events, which subsequently lead to dangerous acts and processes and a dangerous work environment and ultimately creates any injury. He further illustrated that accidents can be a combination of unsafe acts and work environment. The “five-factor accidents equence” was proposed by him in order to show how each factor would activate the subsequently step to cause an accident. According to him, those five factors are Social Environment and Ancestry, Worker fault, unsafe act together with mechanical and physical hazard, Accident and Damage or injury.

Multiple Causation Theory

Multiple causation theory is a further development of the domino theory. As per this theory, several contributory factors can cause workplace accidents and, in most cases, a combination of certain contributory factors can result in an accident. This theory categorizes the major contributory factors into two major groups as; Behavioral factors and Environmental factors.

Safety Training

Workers safety participation, on the other hand is defined as behaviours “Frequently voluntary”(Griffin & Neal, 2000). In other words, According to Griffin & Neal (2000) those are actions that may not pay straight attention to occupational safety, but that helps to create an working environment which safety conditions are being measured (Mashi et al, 2016). Safety training can be identified as an important representative for the victory of an entire business (Zohar, 1980). As a very important risk prevention and control strategy can be named as safety training which is providing a guarantee of the safety of every employee in an organization (Cohen, 1998).

Job stress

Stress can be occurred when there is collaboration between individual and his/her environment that yields emotional strain which can affects to one person’s physical and mental condition (Bowin and Harvey, 2001). Stressors are the factors which creates uncomfortable state of mind within an individual. Stress is a phenomenon that can make individuals capability to continue important variables (psychological, societal, religious or organic) upset within some limits (Blumenthal, 2003). Stress is a fact that nature is intangible and cannot be touched and it is a complicated occurrence. When the job is not connected or matched with the worker’s skills, resources and needs, emotional breakdowns as well as physical injuries can be taken place and it can be defined as ‘work stress’ (Park, 2017). According to the International Labour Organization (2020), it was identified as a mental and physical challenge a person and even for an organization.

Rate of Workplace Accidents

According to the International Labour Organization (2020), a workplace injury is defined as any personal harm or hurt, disease or death which is occurred as a result of an accident in the workplace. Therefore, an occupational injury is different from an occupational disease. Because a disease constricted as a result of an exposure to various risk factors over a long time period which are arising from work activity (ILO, 2020). Recently, physical arrangement in the workplace is playing major role in order to establish the work performance to meet the required standards (Price, 2002). According to the information of the Worldwide Labour Organization (2020) in its report, “Approximately 4% of the worldwide Gross National Product (GNP) is lost due to the costs of losses, deaths and illnesses, resulting in work absences, treatments and payments due to disability or death” (González et al, 2016).

Safety training and Work Place Accidents

It is very important to secure employee’s right during an injuries and accidents. Occupational safety can be begin with well trained workforce (National Safety Council, 2019). Conventionally, occupational accident research has attentive on identifying personal or individual attributes. Many researchers have focused on personality traits or attitudes associated with individuals (Gyekye, 2005; Hansen, 1989; Shaw and Sichel, 1971; Sutherland and Cooper, 1991). As very important safety practice, many countries were enacting the occupational safety legislations in the late 90s. Overtime, the focus is directed to the organizational context gradually. In the middle of the 20th century, the efforts were expanded from individual worker to giving effective safety training to all workers within an organization. Then latter years of 20th century it has be more and more expanded to the organizational context rather than considering to one individual worker’s safety. (Hofmann, 2017).

Working Conditions and Work Place Accidents

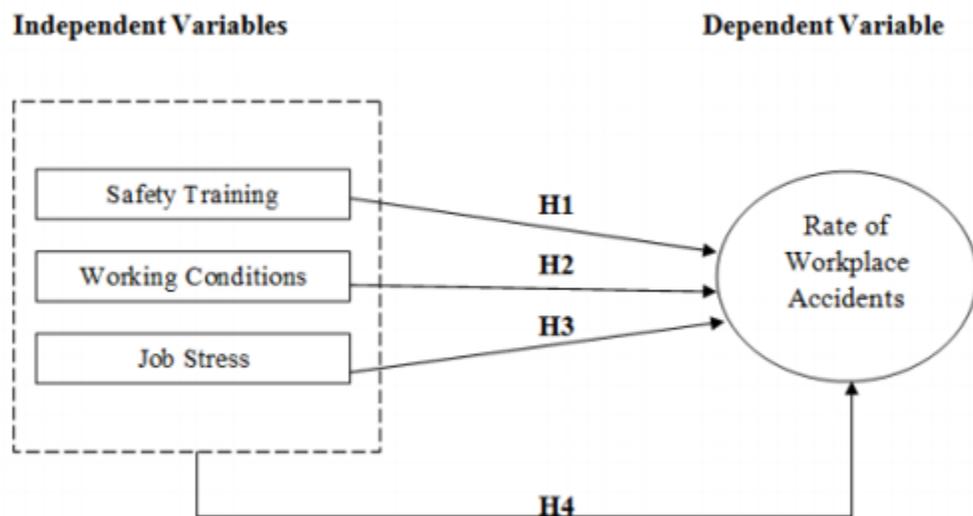
The variance in payment and working conditions provide for the employees have resulted in the continues movement of laborers from enterprises paying low and having poor working conditions to enterprises paying high and having higher working conditions

(Galhena, 2012). In Asia, Latin America and Africa their business owners of small scale businesses has intentional actions to improve the working conditions and ended up with high productivity. If an organization tries to improve working conditions, it will positively affects to the employees that they get the feeling of caring by the organization. It is frequently surprising how small improvements are appreciated far beyond the time and money invested. (Hamid et al, 2008). Work performance will be affected by many factors such as personality, the difficulty of the task, availability of resources and working conditions. in order to achieve high work performances, as managers organizational management should consider about employees' ability, motivation and the resources to meet the organizational goals (Liu et al, 2014).

Job stress and Work Place Accidents

When there is project going on, the particular manager should identify the diversity of workers functions and stress related to it and restrained the factors which lead to high stress levels (Keller, 2001). The phenomenon called job stress always involves in more complex interactions between the individual and the environment. When workers deal with machines, current and other high tech equipment there should be a high attention to those items. For that workers need to clear with their mental stability. Now a days, competition within the industrial environment has grown very fast. On the other hand, after some consideration, that time plays an important role (Beehr et al, 2010).

Conceptual Framework of the Study



Source: Authors Developed

III. METHODOLOGY

Study Design

Quantitative research design was used to conduct this study. This study examines the relationship between safety training, job stress, working conditions and rate of workplace accidents of operational level employees in manufacturing sector. According to Sekaran & bougie (2010), using the same natural environment which is workers normally function can be used to conducted studies in order to make the cause and effect relationships. Therefore, this is a co-relational field study. Because no any factors were controlled or manipulated in this study, non-contrived settings were used to conduct this study where events were naturally occurred with minimum researcher interference.

Data Collection Method

The targeted population for this study was 210 working operative level employees and according to the Morgan table, 136 operative level employees were selected as the sample through simple random sampling method. All operative level employees have almost

similar job descriptions and job specifications to perform their jobs. Therefore, the sample was homogeneous and directly could be used to examine the whole population of this study. The questionnaire is the main method for this research which is primary data obtained. The researchers distributed questionnaires to operative level employees who were working in manufacturing sector organizations and collected them by the researchers. Even the sample is 136, the researchers were able to collect only 130 questionnaires. The questionnaire was designed with 46 questions with three sections: first sections was to gather respondent demographic details whereas second section was to measure safety training, job stress and working conditions based on Likert Scale method.

Data Analysis Method

IBM® SPSS® Statistics 22 statistical software program has been used to data analysis procedure. After completing the data collection procedure, the data was entered into the software and generate the outcomes by using it. All variables in the conceptualization model and demographic variables of the sample were analyzed using Descriptive Statistical Method: frequency distributions which were presented using Pie charts for categorical variables, histograms for ordinal variables and frequency distribution tables for ratio variables (safety training, working conditions, job stress and rate of workplace accidents) which were interpreted using central tendency, data distribution and dispersion of data.

The compute of central tendency was calculated for each and every variable in the study conceptual model. These variables were measured by using interval scale which are 5 points and 7 points likert scale. Therefore the value was taken as the central tendency measure for this study analysis. And, the dispersion of data was analyzed by interpreting Standard Deviation and Variance.

The Correlation analysis was the method which used to measure the relationship between independent variable and dependent variable of this study. This was developed to calculate the degree and the path of the relationship between independent variables (safety training, working conditions and job stress) and dependent variable (rate of workplace accidents) of operative level employees in manufacturing sector. Reliability of the measurement scales was tested by using Cronbach’s alpha (α). As suggested by Bryman and Bell (2011), values of $\alpha > 0.8$ are typically engaged as a rule of thumb for satisfactory inner reliability, although most of the researchers believe somewhat 95 lower figures.

IV. RESULTS AND DISCUSSION

The composition of the sample was analysed in respect to demographic Variables: Age, Gender, Marital Status, Working Experience and Working Hours of respondents. Exploratory Data analysis of this study was done by using SPSS software and it was focused to examine normality of the data, correlation analysis to find out the relationship between independent variables (Safety training, Working Conditions and Job Stress) and the dependent variable (Rate of Accidents) and multiple regression analysis to explore the impact of independent variables on the dependent variable of this study. Mean, median and mode values of safety training, working conditions, job stress and rate of accidents are closer to 3; meant central tendency was indicated in the data set which could be explained that data has been distributed symmetrically. When considering skewness of safety training, working conditions, job stress and rate of accidents, values were 0.098, 0.050, 0.080 and -0.027 respectively thereby it could be concluded that all values of skewness were closer to zero (0) which denoted a normal data distribution. Since kurtosis values of safety training, working conditions, job stress and rate of accidents were 1.010, -.691, .804 and -.552 which explained a heavy tailed data distribution for safety training and job stress while a flat tailed data distribution for working conditions and rate of accidents.

Correlation Analysis

The relationship between study variables was measured by correlation analysis in SPSS software and it was done in three times to explore the relationship between safety training and arte of accidents, working conditions and rate of accidents and job stress and rate of accidents accordingly.

Table 1 Correlation analysis

Independent Variable	Dependent Variable	Sig. (2 tailed)	Pearson Correlation	N
Safety Training	Accident Rate	0.002	-0.184	130
Working Conditions	Accident Rate	0.003	-0.254	130
Job stress	Accident Rate	0.000	0.694	130

** . Correlation is significant at the 0.01 level (2-tailed).

Multiple Regression Analysis

Table 2 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.230 ^a	.53	.050	.22574

a. Predictors: (Constant), JS, WC, ST

According to the above table, R square is 0.53 which indicates 53% of the dependent variable: Rate of Accidents is explained by independent variables: Job Stress (JS), Working Conditions (WC) and Safety Training (ST). In contrast, 47% of the rate of accidents is not explained by Job Stress (JS), Working Conditions (WC) and Safety Training (ST) in this study and there may be some other factors which affect to the rate of accidents in agricultural sector in Sri Lanka.

Table 3 ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.347	3	1.116	21.892	.000 ^b
	Residual	59.976	130	.461		
	Total	63.323	130			

a. Dependent Variable: Accident Rate

b. Predictors: (Constant), JS, WC, ST

As per the above table, overall model fit of the study can be explained by considering the F value which is 21.892 along with the significant value of 0.000 which is less than 0.05 or significant at 5% confidence level.

Table 4 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.065	.088		57.641	.000
	ST	-.020	.030	-.024	-.662	.008
	WC	-.170	.026	-.238	-6.445	.000
	JS	.025	.022	.033	1.131	.001

a. Dependent Variable: Accident Rate

According to the coefficient table above, regression equation can be derived as follows where ST stands for Safety Training, WC stands for Working Conditions and JS stands for Jos Stress with the dependent variable of Rate of Accidents.

$$Y = a + bx$$

Rate of Accidents = 5.065 – 0.020 ST – 0.170 WC + 0.025 JS
--

According to the equation built above, it can be explained the extent to which rate of accidents can be changed in respect to change of one unit of Safety Training, Working Conditions and Jos Stress. When one unit of Safety Training, Working Conditions and Jos Stress change, the rate of accidents will be decreased by 0.020 or 2%, 0.170 or 17% and will be increased by 0.025 or 2% respectively.

Summary of Accepted Hypothesizes

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Table 5 Summary of accepted hypothesizes

Alternative Hypothesis	Status
H1: Safety training has a relationship with the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted
H2: Working conditions have a relationship with the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted
H3: Job stress has a relationship with the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted
H4: Safety Training, Working conditions and Job stress have an impact on the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.	Accepted

V. Recommendations based on research findings

According to the data analysis, findings of this study are supported with the literature. As per the findings of the study, following recommendations can be developed to reduce workplace accidents in Manufacturing sector, Central Province, Sri Lanka.

According to the table 1, it was proved that there was a slightly negative relationship (Pearson Correlation = -0.184 with Sig. value of 0.002) between Safety training and the workplace accidents in Manufacturing sector, Central Province, Sri Lanka. Based on the above discussion, it can be recommended that Manufacturing sector, Central Province, Sri Lanka needs to concentrate current safety training practices, procedures and policies whether they are efficiently and effectively being used within the organization. Unless, proper policies for safety related training programmes should be developed with the mutual agreement and collaboration of employees and managers. According to the table 1, Rate of accidents would be behaved according to the safety training provided by Manufacturing sector, Central Province, Sri Lanka in a negative manner to some extent thereby it can be concluded that safety training has no very strong correlation with rate of accidents of employees who are working in Manufacturing sector, Central Province, Sri Lanka. Current safety training programmes may not be directly linked to reduce workplace hazards since it has no impact on increasing or decreasing workplace injuries of employees, but, according to the literature mentioned at the beginning of the research, it was proved that safety training would do a considerable impact on reducing workplace hazards and injuries.

As per the table 1, it could be recorded that there was a negative relationship (Pearson Correlation = -0.254 with Sig. value of 0.003) between Working conditions and workplace accidents In Manufacturing sector, Central Province, Sri Lanka. Further, it indicated that rate of accidents could be varied due to working conditions moderately, in a negative way. When working conditions would be better or enhance, the rate of accidents would decrease moderately. Based on above discussion, recommendations can be built on enhancing workplace working conditions in order to make a considerable relationship and impact from working conditions to reduction of workplace accidents. According to demographic variables analysis, manufacturing sector, Central Province, Sri Lanka has majority of male employees who are working within the organization and they may not seek for better working conditions as female employees. That may be the reason to get a lowest correlation between working conditions and accident rate. However, Literature supports that working conditions make a considerable impact on workplace accident reduction and manufacturing sector, Central Province, Sri Lanka needs to pay attention on enhancing, enriching and strengthening workplace working conditions based on employee comfort ability and productivity.

As per the table 1, findings denoted that there was a positive relationship (Pearson Correlation = 0.694 with Sig. value of 0.000) between Job stress and the workplace accidents in Manufacturing sector, Central Province, Sri Lanka. Compared to other independent factors: Safety training and Working conditions, Job stress has correlated with the rate of accidents considerably. Therefore, it can be concluded that male employees are suffering from a huge working stress and that would lead to arise and increase accidents in the workplace. Manufacturing sector, Central Province, Sri Lanka needs to concentrate human side of the employees and reduce the workload and offering a bearable workload. According to the table 2, it could be proved that moderate impact ($R^2 = 0.53$) was done by Safety Training, Working conditions and Job stress on the workplace accidents In Manufacturing sector, Central Province, Sri Lanka.

It means, 53% of the rate of Accidents could be explained by Job Stress, Working Conditions and Safety Training while 47% of the rate of accidents was not explained by them in Manufacturing sector, Central Province, Sri Lanka.

VI. Conclusion

As per the study conducted within the manufacturing sector, Central Province, Sri Lanka mainly three accident causation factors were identified and evaluated the relationship between those factors and rate of accidents. Those factors can be recognized as Safety training, Working conditions and job stress. According to demographic variables analysis, the selected organizations in the manufacturing sector has majority of male employees who are working within the organizations and they may not seek for better working conditions as female employees. That may be the reason to get a lowest correlation between working conditions and accident rate. According to the table 1, it was proved that there was a slightly negative relationship (Pearson Correlation = -0.184 with Sig. value of 0.002) between Safety training and the workplace accidents. According to the same table, Rate of accidents would be behaved according to the safety training provided the organization in a negative manner to some extent thereby it can be concluded that safety training has no very strong correlation with rate of accidents of employees who are working in the Company. As per the table 1, it could be recorded that there was a negative relationship (Pearson Correlation = -0.254 with Sig. value of 0.003) between Working conditions and workplace accidents. Further, it indicated that rate of accidents could be varied due to working conditions moderately, in a negative way. When working conditions would be better or enhance, the rate of accidents would decrease moderately. As per the table 1, findings denoted that there was a positive relationship (Pearson Correlation = 0.694 with Sig. value of 0.000) between Job stress and the workplace accidents. Compared to other independent factors: Safety training and Working conditions, Job stress has correlated with the rate of accidents considerably. Therefore, it can be concluded that male employees are suffering from a huge working stress and that would lead to arise and increase accidents in the workplace. On the other hand, according to the table 10, it could be proved that moderate impact ($R^2 = 0.53$) was done by Safety Training, Working conditions and Job stress on the workplace accidents in the organization. It means, 53% of the rate of Accidents could be explained by Job Stress, Working Conditions and Safety Training while 47% of the rate of accidents was not explained by them. Safety trainings and working conditions provided to employees would not correlated with the rate of accidents happened in the organization in a sufficient way while job stress had made a considerable correlation as well as an impact on the rate of accidents of employees. Therefore, it can be concluded that job stress would be the most affective factor, out of selected factors, which lead to workplace accidents for this study and there may be several other factors which would lead to work place accidents.

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Immersive Reality Exercise Bike

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Abstract- Despite the diversity of lifestyles, health and fitness has always been an important part of the lives of any individual. And as technology has grown and improved, the need for exercise has only increased exponentially. The change in the components used in foods, as well as technology focussed toward providing the user with a comfortable user experience, has all led to the development of unhealthy body conditions. Moreover, exercise has always been an activity that demanded that the individual partaking in it would have to be genuinely motivated or interested, as in most cases, exercise involved repetitive actions without any real interesting aspects. Multiple efforts have been made, over the course of the past few years, even the past decade, to make exercise an interesting activity, and have seen success to a very little extent.

One such piece of exercise equipment is the common workout cycle. With the application of IOT and VR, this same simple workout cycle can be transformed into a simulated reality with custom experiences, enabling the user to feel as though he or she is actually travelling or cycling somewhere, as opposed to being stuck in one single place. A custom made exercise bike is used, along with multiple sensors that are connected to the bike, to detect and analyze the user input, and pass the digitized data to the VR device, thus allowing the user to interact with the environment in real time. A Virtual Reality viewing device is used along with the cycle, to enable the user to view the environment in which the user is cycling in. Using unity, a completely realistic and natural map will be created, complete with trees and other objects depending on the nature of the environment. Utilizing the input from the exercise bike's sensors, a 3d model of the bike, on which the user is seated in the virtual environment, will interact with the user's surroundings. In this manner, unity will be used to build a number of environments that will be presented to the user as map options, such as a dessert, a city or even a forest. Irrespective of the manner in which the user views the VR environment, the user will be presented with a HuD (ie, Head up Display), where the user can view information about how fast the user is moving, the distance travelled by the user, etc. This, and the other features such as ability to get news notifications, and to possibly compete against friends using the same cycle elsewhere, would make the otherwise boring workout cycle, an interesting piece of fitness equipment, which would prove to be instrumental in improving the fitness of individuals in all areas of life, from all ages.

Index Terms- Arduino, Exercise, Unity, Virtual Reality.

I. INTRODUCTION

In this modern age, where people are more aware about their physical condition, science has proven that genetics aside, an individual's lifestyle and habits have a considerable influence on their health and physical condition. This link between lifestyle and health can be clearly seen in society, where the individuals that lead healthy lifestyles, are in better health, while those that lead unhealthy lifestyles, are suffering from diseases due to bad physical condition. Recent advancements in technology don't seem to be bettering the situation either. Technology has always been geared towards improving the quality of lifestyle of humanity, by simplifying and handling difficult tasks, while providing people with degrees of comfort and luxury. This however, has made it easier for individuals in modern society, to lead an unhealthy lifestyle. A clear decline in the level of health can be seen across the generations, where the younger generations seem to be the ones that are less healthy. This is accompanied by an alarming increase in the number of cases of diabetes, heart attacks, and other conditions that arise from poor health, in the younger generations.

Exercise is the main solution that is constantly advised, to better one's physical condition and health, yet many individuals prefer not to exercise. The main reason behind this being that exercise is a long term process, is repetitive and requires dedication. And the equipment being used is yet to catch up with the current level of technology. But if exercise were to be made more entertaining, more modernised, more rewarding, then more individuals would take an interest in exercising, thus bettering their physical condition. By utilizing the available level of modern technology, we can achieve this.

II. LITERATURE REVIEW

The origins of VR can be traced back to the artists of Europe during the Renaissance, where they created work that caused viewers to perceive things that did not exist. Since then, many breakthroughs were made in the area of Virtual Reality, ranging from flight simulators to implementations in the medical field. As the years went by, the focus shifted to the public sector, and VR technology became available to the masses. Applications were

developed in the areas of entertainment and education, which led to the popularization of Virtual Reality.

Research exploring the potential of Virtual Reality, and especially the ones focussing on human response to Virtual Reality, had discovered that the human response was largely positive, as most activities became more engaging and entertaining, when coupled with a VR element. One experiment had made a comparison between test subjects exercising on a cycle with just a mounted display, while the other subjects were making use of a VR headset. They were provided the same visuals and conditions, to minimalism or eliminate other factors. The results showed that the subjects that had used a VR headset, had cycled longer than the subjects that had just used a mounted display, and that they had found the experience more engaging and entertaining than the other test subjects. This indicated that VR could be utilized to enhance an individual's experience in any activity.

Attempts were made to integrate Virtual Reality elements into activities such as exercising but most of them had involved a pre recorded video clips or experiences being played on a viewer's headset, as the viewer took part in that particular activity, which was observed to not have a considerable impact in the user experience or performance, which was the main drawback of such applications.

III. PROPOSED APPROACH

Previous attempts at integrating VR and exercise had employed pre-recorded media for providing the individual with a VR experience, which had unsatisfactory results as it had resulted in a lack of immersion. The implementation of the interfacing between the user's inputs and the Virtual Environment or media, had to also be such that no delay was present between the user's actions and the required response from the system. By interfacing the inputs of many sensors with a Virtual Environment, a higher level of immersion can be achieved.

A custom made exercise bike is used, along with multiple sensors that are connected to the bike, to detect and analyze the user input, and pass the digitized data to the VR device, thus allowing the user to interact with the environment in real time. The entire hardware setup interacts with an arduino, which is used to get the user input from the exercise bike. A potentiometer is used to detect the angle at which the handlebar has been turned (left or right), and passes this input to the arduino. A Hall sensor is used to measure the speed at which the user is pedaling, at any given time by determining the number of rotations made by the pedals. The arduino puts the steering input and the speed input in unity, thus interacting with the unity environment, using the entire cycle as a controller. A Virtual Reality viewing device is used along with the cycle, to enable the user to view the environment in which the user is cycling in. The environment is preferably

viewed through a VR headset, but since the cost of a VR headset is high, and most users would not be able to afford one, the environment can be viewed through an ordinary display device.

IV. DESIGN

1. Arduino

Arduino is a company that produces hardware and software which are open source, that primarily produces the microcontrollers and microcontroller kits which are used for building digital devices. These boards are provided with digital and analog IO pins that can be used to interface with many other circuits and components. The boards feature serial communications interface and also support communication over USB(Universal Serial Bus) in some models for loading programs from a personal computer. The programming of the microcontrollers can be done using C/C++ programming languages. The Arduino has an open source hardware meaning that it can be manufactured by third party manufacturers legally. This allows for the arduino to be available very cheaply anywhere in the world. Most boards consist of an Atmel 8-bit AVR microcontroller with different pins, flash memory and features depending on the model. Most boards feature a 5V linear regulator and a 16Mhz crystal oscillator or ceramic resonator.

The arduino microcontroller boards comes with a pre-installed bootloader that helps with the upload of a program from a native personal computer onto the board's flash memory. The Arduino UNO is chosen as it offers ample performance at a much affordable price. It has an Optiboot bootloader. The program is loaded onto the board via USB from another computer. This is performed using USB to serial adapter chips(such as Atmega16U2).



1.1 ARDUINO-IDE

The Arduino Integrated Development Environment (IDE) is an application available across different platforms(Windows, Mac and linux), and is programmed in Java. It includes a text editor that has automatic indenting, brace matching, syntax highlighting and so on. This makes programming in the IDE much efficient and simple. It also features a one click compile and upload button making it easy to upload programs onto the microcontroller board. It supports C and C++ using unique rules for code structuring. The arduino library offers many Input Output procedures. A custom code written by a user, only requires the following two functions: for starting the sketch (setup()) and the main program which is loop (loop()). Which are then automatically linked with the main() program. A Serial monitor is used to obtain any output from the microcontroller board, as it offers a quick and easy way to establish a connection with the board. Arduino is used to obtain the speed and direction of the cycle in real time. It gets the data in the form of electrical signals which are then converted to more meaningful values which are then sent to a serial monitor which can later be intercepted by the unity program.

2. Potentiometer

A potentiometer is a resistor with three terminals, with a rotating contact that forms an adjustable voltage divider. The potentiometer used in the build sends out current having voltage between 0 and +5v. The variable resistance can be regulated using the control shaft of the potentiometer. The potentiometer output is read as analog signals by the arduino. The handlebar is connected to the shaft of the potentiometer. This is done so as to obtain an analog input for the direction. The output of the potentiometer is mapped between values of -180 and 180 by the arduino. That is, when a voltage of 5v is provided as input to the arduino from the potentiometer the signal is read and a value of 180 is passed to unity, similarly when the voltage is 0 the value passed would be -180. This is used as direction input in unity. The directions will be mapped such that 180 is hard right and -180 is hard left.



3. Hall Effect Sensor

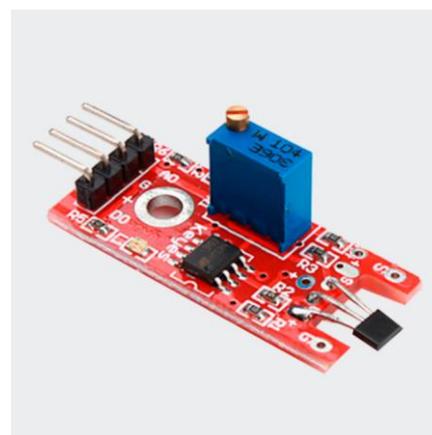
A Hall effect sensor is used to measure the intensity of a magnetic field. Its voltage output is directly proportional to the intensity of the magnetic field. It has a thin metal strip to which current is applied along it. This causes the electrons in the metal strip to flow from one region to another. During the presence of magnetic field, the path of the electrons will become deflected from a straight line. As a result one region of the conductor will be positively charged and the other negative. Hence a new voltage will be produced which is known as Hall voltage. This is better than a conventional inductive sensor as inductive sensors require moving or changing magnetic fields whereas hall effect sensors can detect stationary or non moving magnetic fields.

The advantages of using hall effect sensor are: It requires no contact to work, that is the magnetic field detection does not require the sensor to touch the magnet.

The sensor can be placed in a sealed container so that external contamination will not occur. It can operate at much higher frequencies as compared to a mechanical counterparts. The only disadvantage is that the accuracy in reading the strength of the magnetic field can vary. This is not an issue as the primary use for the sensor in the project is to detect the presence of magnetic fields. The hall effect sensor is a sensor when applied current can detect the presence of magnetic fields. The hall sensor is attached to the frame of the cycle pointed to the outer edge of the driven wheel.

A magnet is attached to the outer edge of the driven wheel. Hence, when the drive wheel rotates the driven wheel, each rotation of the driven wheel can be detected by the hall sensor. Every rotation made by the driven wheel is detected by the hall sensor when the signal is sent continuously, the speed of the driven wheel is calculated in rotations per minute in the arduino

The rotations per minute can be converted to meter/minute by, $speed = 2\pi r * rpm$, where r is the radius of the driven wheel



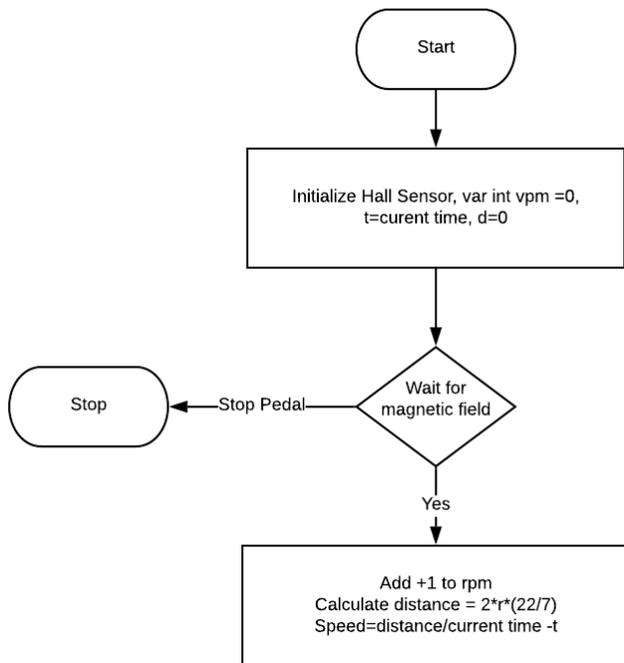


Figure 1 . Hall sensor speed calculation

4. Virtual Reality

The essence of Virtual Reality is derived from the meanings of the words ‘virtual’ and ‘reality’ . Therefore the term Virtual Reality, means anything that is close to being a reality. This being a broad definition, could literally mean anything, including a type of recreation of reality. Our perception of the world is generated by our brain, through the analysis of the data received through our many faculties. The base faculties being the five senses : touch, taste, sight, smell, and hearing. In reality, human beings possess many more faculties than these, like a sense of balance. And since the reality we perceive is actually a blend of tactile data obtained through our faculties, it would make sense that if one were to feed his or her faculties, made up data, that person’s very perception of reality would change in the light of it. The individual would have perceived a version of reality that did not exist, but they would perceive it as genuine. This is the very essence of a VR experience. VR is usually implemented using PC innovation. There are many frameworks that are used to implement Virtual Reality, but they all achieve the same thing, allowing the user to experience the Virtual Environment. The VR environment should produce the proper responses to the individual’s investigative actions, as they explore the environment. If there were to be a delay in the response to a user’s action, from the VR environment, the individual’s experience would be largely affected as they will easily perceive that the reality is counterfeit, and they begin to react in an unnatural manner.

4.1 Virtual Reality Devices

The most significant bit of a computer generated simulation unit is the headset, a gadget like a thick pair of goggles that goes over one’s eyes. The more costly, better headsets should be associated with a PC to run applications and games, while some less expensive ones utilize a mobile phone attached to the front of the headset. All headsets should be utilized close by a decent quality pair of earphones, and there are other discretionary frills from hand controllers to treadmills that are completely intended to upgrade one’s reproduced understanding of being in a different universe. Hand controllers decipher one’s true motions into whatever game or application the person is utilizing, albeit standard gaming joypads can likewise be utilized.

The following constraints are present for virtual devices :-

- Latency - The whole system must respond almost immediately, to user movement, or the user may end up suffering from virtual reality sickness. A high refresh rate and a powerful GPU to render the required number of frame rates.
- Lenses - The focal points of the headset are liable for identifying the very near presentation to a wide field of vision, while likewise giving a progressively agreeable far off purpose of core interest. One test with this is giving consistency of center: since the eyes are allowed to turn inside the headset, it's critical to abstain from pulling together to forestall eye strain.
- Resolution and Display quality - There are various optics and visual characteristics that will influence how the individual sees the picture quality and their experience of the virtual world. The picture lucidity relies upon the presentation goals, optic quality, refresh rate, and the field of view.

Most Virtual reality devices have high quality hardware, but are equally costly.

Enforcing the use of such a virtual reality device, would create a barrier to entry for most users, who are unable to purchase such hardware. An economic approach to this problem would be the use of Google Cardboard. Google Cardboard is simply built from low cost materials such as cardboard, and it has a provision where a smartphone can be placed, as the device providing the visual output. This device was developed to encourage the growth in VR development.

A user is given the choice between building their own viewing device, and purchasing a pre-made device. In order to convert a smartphone to a VR viewing device, the user will run a Cardboard compatible mobile app on their phone, insert it into the Google Cardboard viewer and then view the content through the lenses in the device.

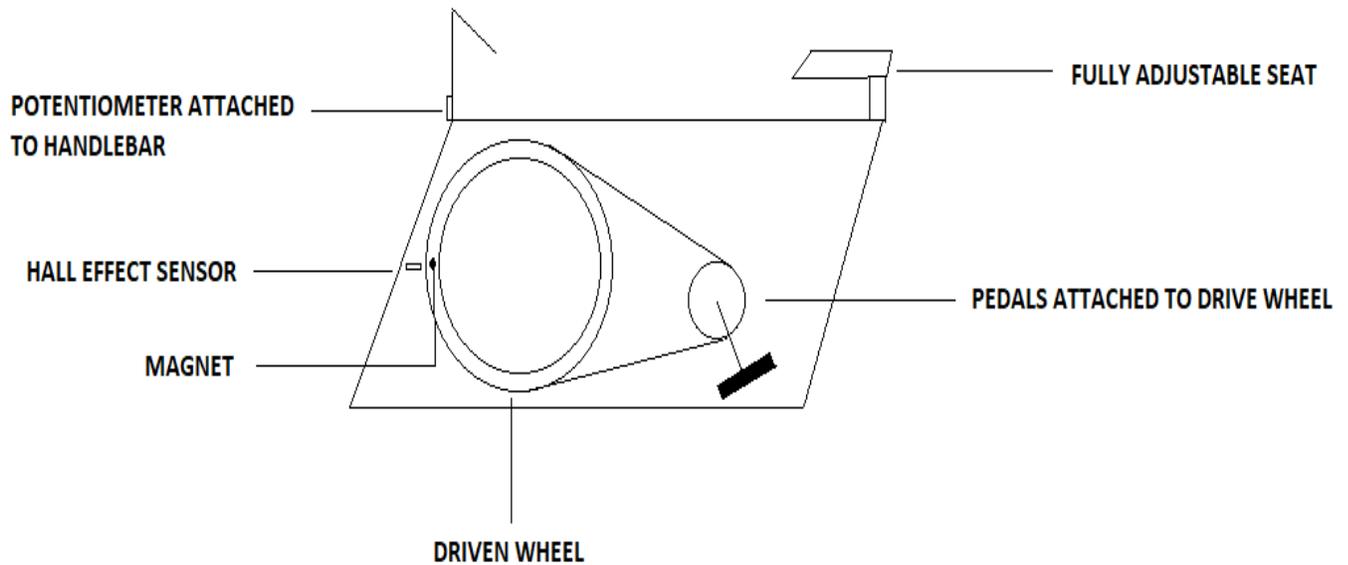
The parts that make up a Cardboard viewer are a bit of cardboard cut into an exact shape, 45 mm central length focal

points, magnets or capacitive tape, a snare and circle latch, an elastic band, and an optional near-field correspondence tag. When the unit is gathered, a cell phone is embedded in the rear of the gadget and held set up by the chosen affixing gadget. A Google Cardboard—good application parts the cell phone represents a picture into two, one for each eye, while additionally applying barrel contortion to each picture to counter pincushion twisting from the focal points. The outcome is a stereoscopic picture with a wide field of view.

5. Unity

Unity is a development platform that utilizes assets and tools to develop 2D and 3D environments, in real time. It's ability to

create whole virtual environments, with custom specified physics rules, various types of objects with a wide range of texture quality, makes it a tool often used by game developers and VR developers. Unity has tools that enable the custom alignment and placing of various objects and assets throughout the environment. These assets can be user made assets or assets available on the asset store. The various tools and editing options provided by unity's editor, allows a developer to craft realistic looking virtual environments.



6. The Virtual Environment

In order to create the environment, we first created a terrain layer and sculpted it using tools provided by unity. By utilizing assets from the asset store, the road was added as a separate element of the environment, with its own high quality texture file, to provide a realistic appearance. Objects, such as buildings, ruins, trees, rocks and boulders, were added to the environment in appropriate locations, with collision enabled, to simulate a realistic scenario. Further effects, such as the movement of the trees in the wind, and the movement of the surface of water, were also implemented by setting parameters in the unity editor. An artificial sky is provided by means of a skybox, which brings to the table, the option for the user to have control over the weather and time of day, especially since the sun is actually a light source that can also be subjected to the user's preferences. Since real life environments appear less clear and more organic than computer generated environments, we applied a visual filter to the user's perspective that further stimulates the different times of day, and also makes the distant objects appear less clear and foggy.

7. Interfacing Unity and Arduino

The user's perspective is through the first person camera, which is provided by unity. By means of custom scripts in C#, we have been able to modify the operation of this first person camera, to accept inputs from the arduino, and interact with the environment accordingly. The input from the arduino is received as a tuple of degree, which indicates the direction of rotation, and the speed of motion. These inputs are processed and then passed as values to functions that rotate and translate the first person camera in the required manner. Because the inputs are received as a constant stream of information, from the arduino, there is near to no lag between when an input is given and the motion of the camera. A 3 dimensional model of a cycle will also be connected to the first person camera, to provide an immersive experience to the user. All these elements come together in the unity engine, to provide the user with an immersive cycling experience. Even though the main focus of the environment will be the path through which the user is cycling, the whole environment will be made as immersive and realistic as possible, to make the user feel less like it's a simulation, and make the experience more

engaging. In this manner, unity will be used to build a number of environments that will be presented to the user as map options, such as a dessert, a city or even a forest. Irrespective of the manner in which the user views the VR environment, the user will be presented with a HuD (ie, Head up Display), where the user can view information about how fast the user is moving, the distance travelled by the user, etc.

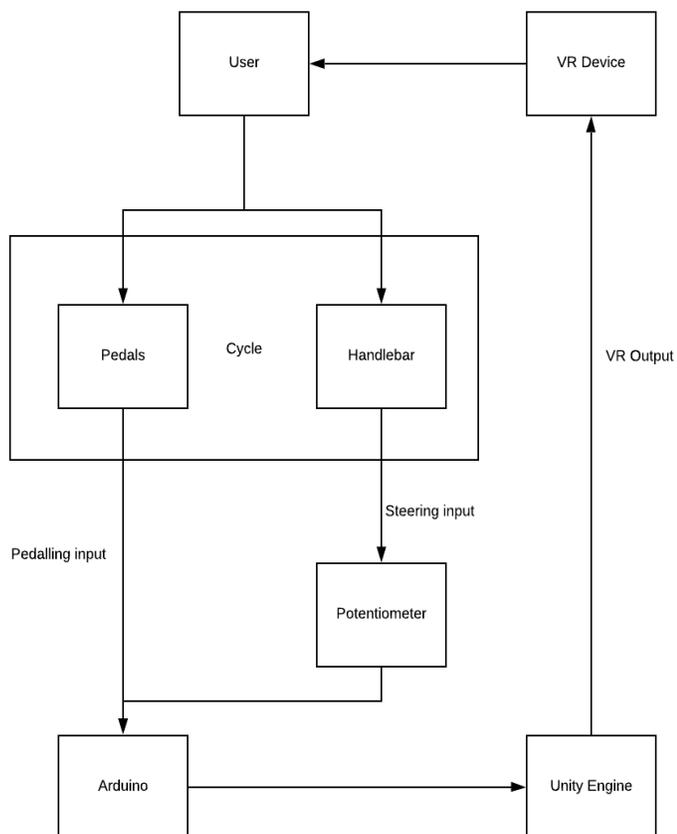


Figure 2. Exercise bike working with VR device

Figure 3. Circuit integration in hardware

VI. CONCLUSION

By this project, we aim to provide the user the experience of cycling through a whole new realistic environment, from the comfort of one's room. And by making this experience as entertaining and engaging as possible, we aim to motivate individuals of all ages to exercise and better their physical health level. We are observing trends in VR environments and fitness, with the intention of ensuring that the user experience we provide, will be found satisfactory by our end users.

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Service Recovery, Empowerment, Training and Commitment in Tanzania

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Abstract- Due to broader social and economic Service recovery has been an important issue that shows greater demand for health, support and care that's why it needs to study the health care services. factors such as empowerment, training and commitment will affect employees toward service recovery. Hence, to the organisations employee is the only source of sustainable competitive advantage. Therefore, service recovery is very crucial to study. Nurse working in public hospitals in Mbeya Referral Hospital were chosen as respondents for this study. Quantitative Reserach Design was used , and analysis was done by using SPSS. Questionnaires were distributed and 80 questionnaires were used for analysis. The results have shown that empowerment, training and commitment have significant relationship to service recovery. The recommendation and conclusion was provided.

Index Terms- Service Recovery, Empowerment, Training , Commitment , Tanzania

I. INTRODUCTION

Nurses' attitudes and behaviours as customer contact employees are considered vital in discovering the quality of healthcare services Tajeddini & Martin (2020). Other researcher has agreed that it is crucial to study the delivery of the nursing service within the context of how it ensures patient safety and service recovery focusing on public hospitals (Mital, Pisano, & Del Giudice, 2020). However, no research has been reported on how to apply identified factors of service recovery among public nurses in order to bring a change in healthcare services. Public hospitals have received numerous issues compared to private hospitals, thus, it is important to identify the factors that affecting service recovery among public nurses in Tanzania.

There are changes in a broader social and economic context that results in greater demand for health, care and support which conclude that it is critical to study the health care services (Rangachari & Woods, 2020). Study made by Tajeddini & Martin (2020) stated that the main objective of health innovation worldwide is to hold the way healthcare services are delivered. However, this condition relates not only to the overall health of individuals and communities, but together with the quality of the healthcare experience. Even though the health care system has committed by performed in the past, there is evidence that shows healthcare system is not working well enough for both, those it serves, and includes the personnel who work in it. The rate of change is continuing until now (Mareeuw, van den Driessen A., Coppus, Delnoij, & de Vries, 2019).

Previous research explores the needs of the nursing service to prevent failure, while aspiring to determine what are the key factors can be identified by the nurse in Tanzania to deal with failures and improve the service and safety of the nursing service in whatever setting it is delivered. However, there is lack of study that focus on government hospitals. However, as the health service as a whole burden under the persisting pressure of having to do more for less and community nursing is fast becoming the service that is unable to say 'no' in their service activities (Qing et al., 2020) . It also gives hope on the daily challenges and rewards of nurses and of how they are working as part of the health system and perform better in handling service recovery.

In order to give a better view about service recovery, many previous researches have been conducted, and researchers came out with many variables to measure service recovery. According to Demir (2020) factors influencing service recovery in the life insurance industry come from three dimensions; human resource management (training, teamwork, rewards and empowerment), organizational (customer service orientation and top management commitment), and personal (role ambiguity, role conflict, affective organizational commitment and emotional exhaustion). However, findings in research by Manalo et al (2020) revealed that education, team work and role ambiguity as frontline job perceptions were found to exert positive influences on the service recovery, but, empowerment, reward, and organizational commitment were found to have negative effects on the service recovery. Hence, the purpose of the study is to complement existing research on service recovery among public nurses in Tanzania.

According to Saridakis et al (2020) service recovery refers to the acts a supplier shows in order to face dissatisfaction. Besides, service recovery also used as a response towards poor service quality such as service failure. There are three categories of service recovery. Firstly, the purpose of service recovery is to achieve customer satisfaction (Saridakis et al., 2020), to improve process, and for the need of internal marketing strategy (Alzoubi, Alshurideh, Al, & Inairat, 2020). However, Osundina & Owoeye (2020) stated that the most important element in the service industry is the service provider itself. Thus, service organizations are critically needed to explore their employees' expectation in enhancing their motivation and retention since motivated and satisfied employees are likely to patronage the firm again and again.

Previous researcher agreed that today's customers are more assertive, better informed and more demanding when service problems occur. Consequently, this may happen due to the

increasing of customer demand for value in the services and products purchased. Besides, the results for customer demands for value lead to a stronger focus on a combination of fair price, good service and quality in the purchases they make (Zhou, Sheng, He, & Qian, 2020). However, a study conducted by Matos, Henrique, & Rosa (2013) stated that it is inevitable to avoid service failure completely in any organization. Service failure can occur when service organization fails to convey the service as the individual customer's expectations (Rapidah et al., 2020).

Managing service quality with the combination of the important role taken by customers in the service production processes are always challenging. It gives obvious signals that customer loyalty contributes on profitability, and consequently makes complaint management as a critical "moment of truth" for service organizations. Therefore, the organization will increase their efforts to maintain and acquire customers through satisfying them. Sometimes the expected or received service does not appear to satisfy the customer which lead into customer dissatisfaction (Scales & Quincy Brown, 2020). In service recovery management, service providers have to commit their efforts to discover the solutions aimed at recovering retaining customers and service failures.

The organizations' capability to increased performance and achieved competitive advantages by empowerment can be clarified by employees who adapt the service accordingly to respond instantly to special customer needs (Wongleedee, 2020). Besides, Cao, Liu, Wu, & Zhao (2000) has stated that empowerment has come out as an crucial element within contemporary organizations where encouragement and real supports are given the freedom to gained the ability to realize organizational goals and get a job done. In addition, vicious competition among service providers and service firms lead to constant struggles to provide and deliver finer quality of customer relationships (Azalli, 2017). This statement has been agreed by other researcher that stated the rising competition and resources in the hospitality industry and the growth of distinctive services has forced holders to continuously pursuit for competitive advantages (Wamuyu, Gichira, & Wanjau, 2015).

The empowered employees might show the customer-oriented service behavior, because they possess more elasticity and capability to match the changeable need of customers. Consequently, in service encounters, the empowered employees would present appropriate and flexible service behaviors towards customers (Alzoubi et al., 2020). Employees should have the right ability, flexibility, and power to be engaged in customer-oriented behavior. Employee empowerment is one of the most effective tools to satisfy and service customers. In other words, empowerment emerges to give subordinates more control over job-related situations and decisions, which allows them to have more flexibility and responsibility with respect to various customers' needs (Elnaga & Imran, 2014).

Training is at the forefront of organizational priorities, and innovation in training is one of the most crucial aspects of the quality improvement. Most managers believe that a good training program is crucial to a company's success (Kamran, 2020). Customer service is starting to mean help the customer deal with more complexity and larger problems. However, if employers expect the employees to do what they do not know how to do, the customers who pay the short-term price while the company will pay the long-term price if the company lose customers. Company may choose to spend more money on training employees to keep current customers or spend more advertising dollars to attract new customers (Jansriboot, 2016).

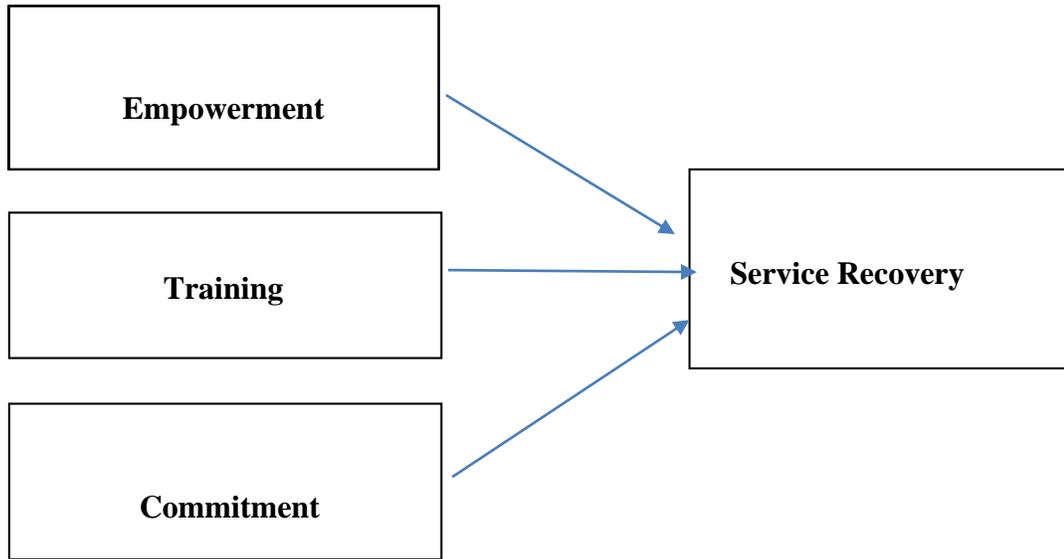
According to Papa et al (2020), well-designed training program helps employees to employ what they have learned. Service literature indicates that employees who have not acquired particular skills to deal with their position are unable to perform their job well and fail to handle customers' complaints. Previous studies also have revealed the importance of customer service training effects on employees' job satisfaction because customer service training leads to develop the skills needed for handling service failures efficiently (Beirami, 2012).

Customer loyalty has been proven to strongly affect profitability that consequently became a top priority in service industries. However, it is a very difficult task to prevent current customers from switching to other service providers (Zhou, 2014). Besides, traditional firms now compete with online channels of communication that lead into the changes of nature of the competition between service firms because of the role of the new information and communication technologies (Scales & Quincy Brown, 2020). The concept of commitment plays a central role, as it is a major characteristic of relationship marketing models. Commitment refers to an implicit or explicit pledge of the continuity of a relationship between exchange partners (Curth, Uhrich, & Benkenstein, 2014).

According to previous scholars, one of the key elements in the operation of a successful hospitality business is the employees itself, which the main drivers of competitive advantages in the hotel industry. Having the right employees can greatly enhance the likelihood of success for any firms (He, Y., Li & Lai, 2011). However, it is important to acknowledge that employees may display a commitment to providing quality service without being committed to the organization (Al-Refai, 2015). Some studies have agreed that employees' satisfaction is critical because customer's satisfaction can only be gained if the employees are content, while job satisfaction is found to be related to organizational commitment (Limpanitgul, Jirotmontree, Robson, & Boonchoo, 2013).

Manalo et al (2020) mentioned that workers that are committed to their organizations perform to a higher standard and with higher perceived service quality. In the context of service recovery, the more committed the employee is, the more successful the employee should be in addressing service failure.

Figure 1: Theoretical Framework of the Research



II. METHODS

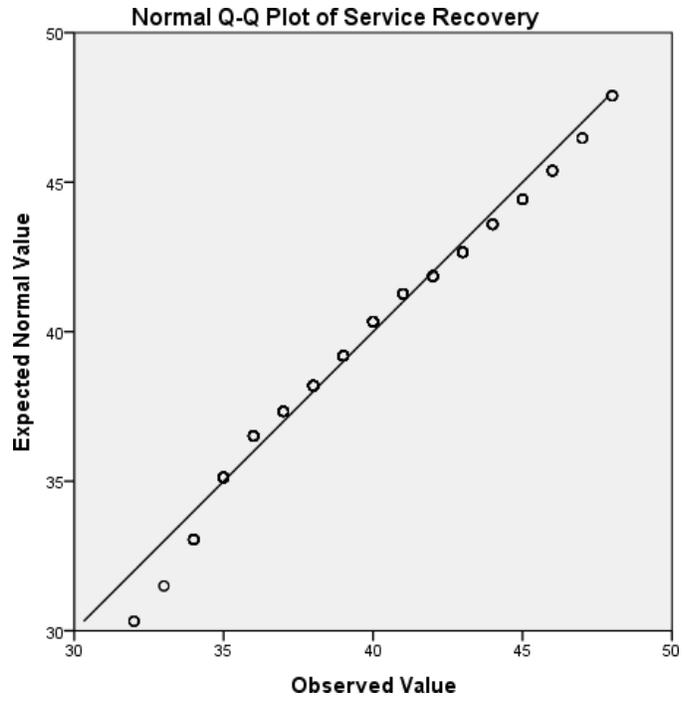
To achieve the objectives of the this research, quantitative and survey based research. Data were analysed using Statistical Package for Social Sciences (SPSS Version 22). Survey based research is a cross-sectional design at a single point in time. Data are collected predominantly by questionnaire. These data will be examined to detect pattern of association (Bryman & Bell, 2011). This research was carried out in the Mbeya Referral Hospital and one hundred nurses were selected using simple random sampling. A complete set of questionnaire was distributed to the nurses and they were completed and returned. Base on Krejcie & Morgan (1970) for 100 participant should be 80 respondents.

III. RESULTS AND DISCUSSION

Normality Test

Normality test is used to determine whether the “error components in the abstract theoretical model for the test are independent and identically distributed normal random variables”. Quantile-Quantile plot or more known as (Q-Q) plot is the most common graphical tool to assess the normality of the data. In a Q-Q plot quantile values of a theoretical distribution are plotted against quantile values of the observed sample distribution (x axis). The quantiles of the theoretical normal distribution are used in a normal Q-Q plot (Totton & White, 2011) The data of this study is normally distributed as shown in Figure 1 to 4.

Figure 1: Service Recovery



Normal Q-Q Plot of Service Recovery

Figure 2: Empowerment

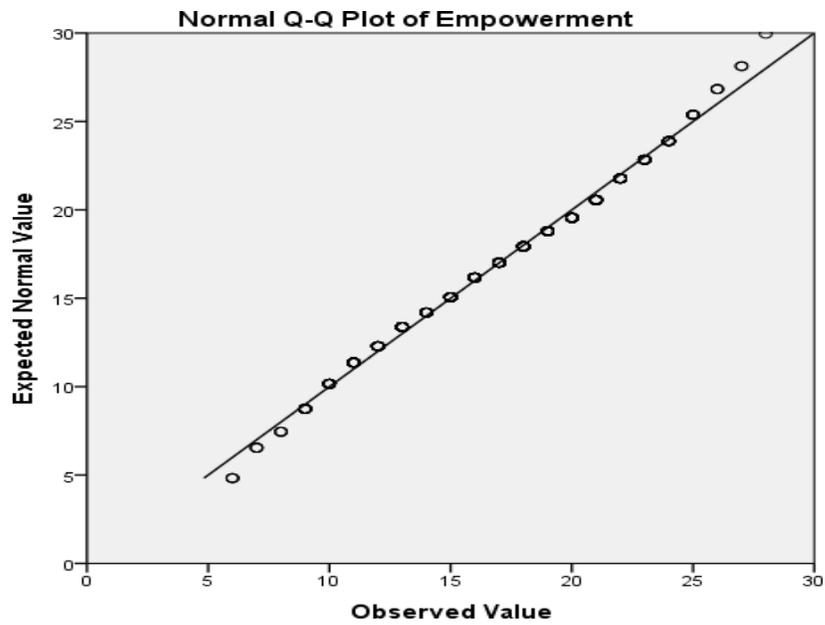


Figure 2: Normal Q-Q Empowerment

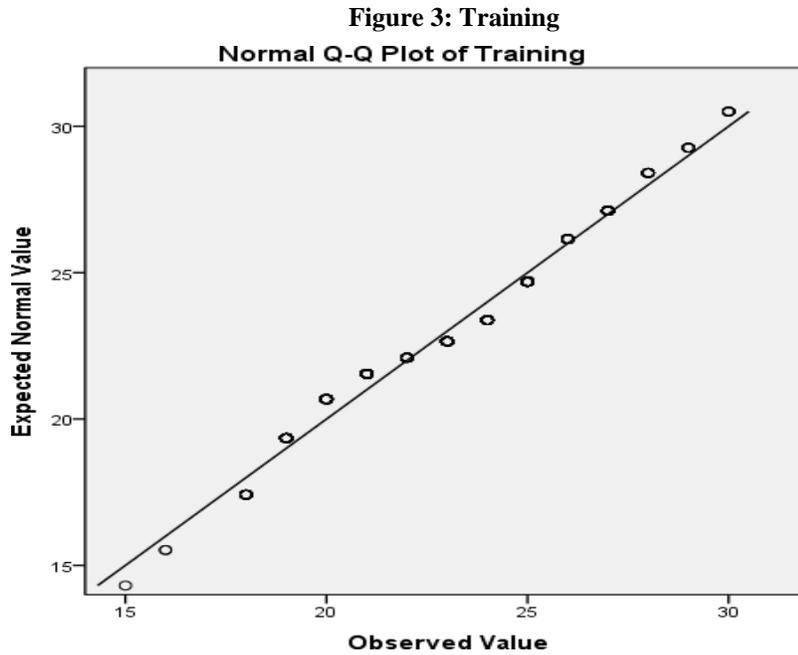


Figure 3: Normal Q-Q Plot Training

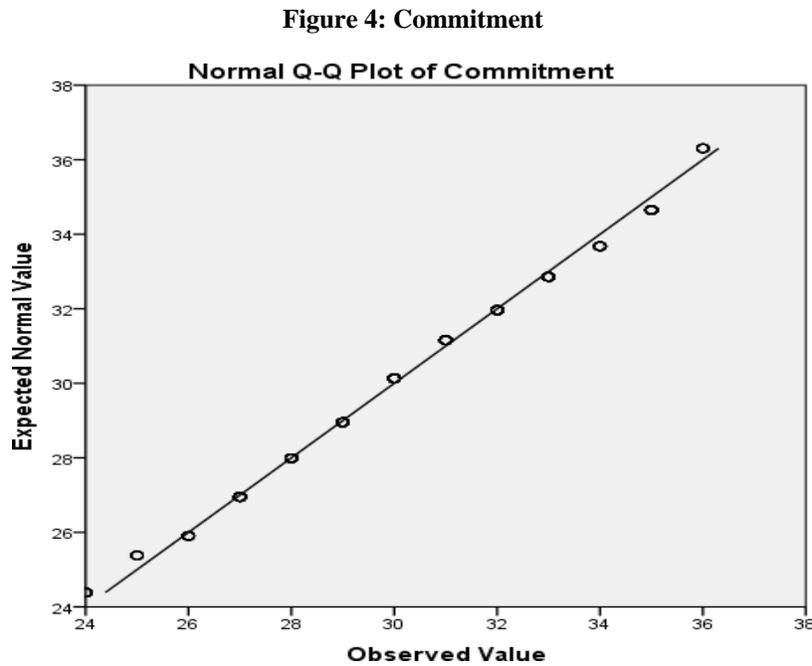


Figure 4: Normal Q-Q Plot Commitment

The result in Table 1 shows that there is positive relationship between empowerment and service recovery at value of 0.000 ($p < 0.01$, Sig. 2 tailed). The positive value of Pearson

correlation ($r = 0.298$) signifies that the strength of the relationship low relationship. There is significant relationship between training with service recover

Table 1
Correlation between Empowerment and Service Recovery

		Service Recovery
Empowerment	Pearson Correlation	.298
	Sig. (2-tailed)	0.000
	N	80

Table 2
Correlation between Training and Service Recovery

		Service Recovery
Training	Pearson Correlation	.425
	Sig. (2-tailed)	0.000
	N	80

The result in Table 3 shows that there is positive relationship between commitment and service recovery at value of 0.000 ($p > 0.01$, Sig. 2 tailed). The positive value of Pearson correlation ($r = 0.351$) signifies that the strength of the relationship is moderate relationship.

Table 3
Correlation between Commitment and Service Recovery

		Service Recovery
Commitment	Pearson Correlation	.351
	Sig. (2-tailed)	0.000
	N	80

IV. CONCLUSION

Understanding the nature and determinants of service recovery performance is a necessary and critical starting point in developing and implementing service recovery programs. Our empirical findings suggest a number of important managerial implications. Commitment, empowerment and training are significant predictors of service recovery by public nurses. This suggests that healthcare management should explicitly design and establish various organizational policies such as employee empowerment, education/training and role responsibilities in order to develop a system that will facilitate a service orientated environment and service recovery. In addition, service recovery is influenced by an individual's level of commitment to the hospital and their role in the delivery of healthcare. More empowerment leads to better service recovery, suggesting that hospital management should take decisive steps to empower their staffs

with the authority to make independent decisions, and give them adequate freedom to assist customers.

In addition, Empowerment and Training also influence service recovery in this journal article. This finding provides additional evidence to the management team to understand about the perception of their staffs about service recovery. Although a degree of acceptance of marketing's appropriateness in healthcare followed any initial resistance, until recently, the great proportion of hospital governance and management has been the domain of clinicians, who had little expertise in conventional management practices or marketing applications in services. It shows that management team should increase their understanding in service marketing to provide better quality of service.

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Occupational Stress in Academic Staffs of Higher Learning Institutions

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Abstract- Stress among workers is becoming more and more prevalent year by year. Stress can lead to other health related problems. Much research has been done to know the causes of stress among workers. In this journal article, academic staff belonging to Higher Learning Institutions in Tanzania was chosen to test whether the causes posed to them were factors causing stress. The objective of this article is to prove that the cause of stress among lecturers is due to demand of staff and support from management. A total set of 55 questionnaires were distributed. The results showed that lecturers of Higher Learning Institutions in Tanzania experience occupational stress. The most common factors that caused occupational stress among lecturers, were lack of support from management, lack of facilities, and feeling work not valued. It is recommended that organisation concerned should help the workers to cope with occupational stress effectively.

Index Terms- Stress, Management Relationship, Management Support, Tanzania

I. INTRODUCTION

Academic staffs are required to undertake duties such as coordinator at the examination unit, student recruitment, student affairs, sports, college time table and schedule, quality assurance, innovation, research, industrial training and alumni, data and more (Ismail & Noor, 2016). In addition, academic staff in Higher Learning Institutions in Tanzania also should perform other tasks including planning and implementing such celebration or feast like, Independence Day, involved in student recruitment, do promotion for college, and others. In addition, there are also academic staffs that bear administrative duties such as administration, development and others (Mohammed, Celik, & Budur, 2020). Long hours of teaching and learning, coupled with other tasks that demand commitment from academic staff will contribute to stress among academic staff in Higher Learning Institutions in Tanzania. Higher Learning Institutions in Tanzania strives to ensure that all requirements of Quality Assurance (QA) are met all the time. In addition, Higher Learning Institutions in Tanzania staffs also have to work hard to ensure the adoption of TCU regulations. All these situations demand a very high commitment from all academic staff to ensure the successes. The imposed of job burden, surely puts stress among academic staff (Tarimo & Swai, 2020). The number of tasks that need to be carried out by an academic staff, then, there will be contributes to the conflict in carrying out the task assign to them. Higher Learning Institutions in Tanzania academic staff in Department of

Administrative studies are facing more problems of workload, role conflict and role ambiguity. The following are occurrence of stress problems among academic staff in Higher Learning Institutions in Tanzania. An increasing the number of students also contributed to the increased in responsibilities and workload of academic staff. An increasing the number of students such in human resource, law and business studies lead pressure on academic staff because of the shortage of facilities for the implementation of teaching and learning. The shortage is like, lack of workshops, rooms, computer laboratories and materials will effects the learning and teaching session. This (increase in the number of students and lack of teaching materials and learning spaces let the uncomfortable condition) will certainly increase the workload, thus contributing to the problem of stress among academic staff in Higher Learning Institutions in Tanzania (Muya & Tundui, 2020)

The working environment and relation among of Higher Learning Institutions in Tanzania. Higher Learning Institutions in Tanzania academic staff also was contributed to the occurrence of stress. The differences in the length of service of academic staff tend to create the perception of old (senior) and new (junior) academic staff also contributed to the conflict and thus put pressure on academic staff either new or old academic staff (Mcvicar, 2003). For an old academic staff, they think, they should be given the opportunity to occupy the position of seniority list and promotion, while for the new academic staff else, they felt that, their talent needs to be highlighted because they have new ideas to be implemented for strengthen Higher Learning Institutions in Tanzania. This perception was contributed to the stress among and instructors of Higher Learning Institutions in Tanzania. This journal article have identified and categorized the job stress factors among lecturers and instructors of Higher Learning Institutions in Tanzania. The job stress factors are used in this journal article are related with selected stress models and previous studies. The job stress factor also related and relevant with the working environment that occurrence the job stress among lecturers and instructors of Higher Learning Institutions in Tanzania.

The job roles need to be carried out well there are cause for failure to do this. Those causes were tested here to see if there were causing stress. Among the causes related to roles are conflicting demands on the job role, unclear job descriptions, lack of support in the job role and lack of career development opportunities are some. Teacher have become stressful because of role demands in institution, for instance when organization member expectation about teacher behaviour are unclear (Pramono, Yanto, & Melati, 2020). As a result, the employee are faced stress because of role

conflict factor that will reduce their job satisfaction, increase in anxiety, and doesn't communicate with other people. The role conflict is most associated with gastrointestinal problem (Cooper & Khan, 2013). Schmidt, Roesler, Kusserow, & Rau, (2014) stated many research are tended to focus on role ambiguity as primary role stress, and less consideration given to role conflict and role overload. Akinmayowa & Kadiri, (2014) also stated that role conflict such as incompatible role expectation from organizational member are resulted from inconsistent information. Demands means more responsibilities and in the same time increase the workloads. The demands causing the stress of academic staff. The demands of academic staff in relation to dealing with student discipline, coping changes in time table or courses taking workload, meeting targets, dealing with auditing processes and etc. Accordingly, experience of meaning of work depends on the extent to which the individual experience satisfaction of basic psychological and social needs at work. The Job Demands-Resource model (Boyd et al., 2011) may contribute towards understanding the interplay between factors in the psychosocial work environment and experience of meaning at work. The JD-R model states that employee perceptions of job demands and job resources have an impact on individual wellbeing. Job demands are those aspects of the job that require sustained physical or psychological effort that may be associated with certain physiological or psychological costs. Job resources are those aspects of the job that are functional in achieving work goals, and stimulate personal growth, learning and development (Saidu & Haruna, 2020).

Controlling the staff often want more power in the workplace than they have been granted. Control of management over staff having no authority to deal with their responsibilities, having to deal with improper planning of management and having no say in decision making. As employee, they will know that they are in workloads when they have make more and often mistake, the staff become short-tempered with other co-worker and at home, the staff are less efficient at workplace, working in the late time in effort to settle the work and the staff are bring back the office work to the home (Sari & Seniati, 2020).

Many jobs demand regular contact with other people at work. Poor or unsupportive relationships with colleagues and supervisors can be a potential source of pressure. Bullying behaviour of manager/ staff, dealing with conflictual situations, feeling isolated from curriculum area are some of the causes for stress. Have good relationship among co-worker are provide more fun and harmony working environment and will prevent stress that ultimately ham1 the staff involved itself (Cooper & Khan, 2013). Office politics is something are normal and always happen in workplace environment. Office politics sometime will be positive and sometimes will be negative effected to which employee are involve. Office politics competition of money and promotions among the staff involved. Nepotism, cronyism and favouritism are occur in many organization. The office politics can effect either professional or white collar worker. The employee are working in large organization, which have many layer of hierarchical, very bureaucratic in which the employee have less and little control on his or she job are almost more stressful than employee are work in small organization, less bureaucratic and simple hierarchical in an organization (Agustina & Rismantono, 2020).

Individuals need to feel that they have appropriate support from management. They also need to feel that they are adequately informed and that they are valued. The lack of support from management it causes the stress. The stress was caused by lack of information, lack of administration support, limited or no access to training, feeling work not value and lack of facilities. All types and nature of work is the main source that contribute to stress formations. It because if the work load given is inappropriate or it might create too much burdens to workers involve. Although an individual's or staff definitely talented and efficient when carrying his or her duties, but in the same time workload given are excess from his or she ability to perform might be negative effects at last such as drop of his or she performance due of he or she physical and mental fatigue and will lead to disease such as heart disease, high blood pressure, emotional problem and others (Fahrudin & Hasanuddin, 2020). The job roles need to be carried out well there are cause for failure to do this. Those causes were tested here to see if there were causing stress. Among the causes related to roles are conflicting demands on the job role, unclear job descriptions, lack of support in the job role and lack of career development opportunities are some. Teacher have become stressful because of role demands in institution, for instance when organization expectation about teacher behaviour are Unclear (Lashkariani & Motevalli, 2020).

II. METHODS

To achieve the objectives of the this paper, quantitative and survey based research. Data were analysed using Statistical Package for Social Sciences (SPSS Version 22). Survey based research is a cross-sectional design at a single point in time. Data are collected predominantly by questionnaire. These data will be examined to detect pattern of association (Bryman & Bell, 2011). This study was carried out in the Higher Learning Institutions in Tanzania and fifty five academic staff was involved. Twelve senior lecturers and fourty three assistants lecturers were participated. A complete set of questionnaire was distributed to the senior lecturers and assistants lecturers and they were completed and returned. The group of 55 academic staff who are both lecturers and instructors were selected from a Higher Learning Institutions in Tanzania. Base on Krejcie and Morgan (1970) for 55 participant should be 48 respondents. But only 40 lecturers and instructors was participated in this research others not replying the survey form. The group consisted of both sex, teaching skilled courses diploma and with different education levels (skilled level to master's degree). This group were sampled due to the various roles they played as educators. They were also played multi roles as role models for students and subordinates to the management as such demands were many. Therefor the group was considered the best to be sampled for knowing whether the causes of stress were true.

III. RESULTS AND DISCUSSION

The correlation analysis shown in Table 1 between demands and control. The demands and control variables coefficient value of 0.476 is positive and significant at $p < 0.01$. The strength of the

relationship between demands and control is at a minor correlation level.

Table 1
Correlations Analysis (Determine the Relationship among Stressors)

		Mean Demand	Mean Control	Mean Relationship	Mean Role	Mean Support
Mean Demand	Pearson Correlation		.476**	.656**	.654**	.586**
	Sig. (2-tailed)		.003	.000	.000	.000
	N	38	38	38	38	38
Mean Control	Pearson Correlation	.476**		.490**		
	Sig. (2-tailed)	.003		.002	.001	.000
	N	40	40	40	40	40
Mean Relationship	Pearson Correlation	.656**	.490**		.826**	.552**
	Sig. t2-railed)	.000	.002		.000	.000
	N	40	40	40	40	40
Mean Role	Pearson Correlation	.654**	.504**	.826**	1	.610**
	Site. (2-tailed)	.000	.001	.000		.000
			40	40	40	40
Mean Support	Pearson Correlation	.586**	.585**	.552**	.610**	1
	Sit. (2-tailed)	.000	.000	.000	.000	
	N	40	40	40	40	40

** . Correlation is significant at the 0.01 level (2-tailed).

IV. CONCLUSION

Occupational stress is a phenomenon that has been widely discussed in the mass media and studied by various experts and authorities in this particular field to find out the causes or reasons for stress among academic staff. The research, which tried to show the factors causing stress among instructors and lecturers of Higher Learning Institutions in Tanzania has proven beyond doubt that these reasons cause stress in varying levels. Employer or organization should help the employees to achieve mental, emotion and physical preparedness to cope with occupational effectively. Organizations, government or private sectors should plan and conduct stress management programs to help employees to manage occupational stress. For instance, it can start with an educational phase whereby the participants learn about the basic concepts of stress, stress management program, ways to measure their own occupational stress level s. The management of the organizations should work hard to identify employees' personalities that fit to certain work environments in their organizations. They should also emphasize on activities such as

job designing, selection and training in their organizations. These activities will help them to find a match between work and individuals in an organization.

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Splintered Recruitment and Selection Activities in Local Governments in Tanzania

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Abstract- Recruitment and selection as one of the human resource management function in the public service in Tanzania takes place in the context of varied public service actors mandated by the number of constitutional and legal instruments. These instruments create the diverse resourcing institutions with rights, duties and functions related to recruitment and selection. It is argued that employee acquisition function in local government authorities in Tanzania does not function against devolution. The function is splintered across the public service institutions including the local government authorities [LGAs]. The subsidiarity and holistic principles including the decentralization by devolution (D by D) policy approach in the delivery of services at grass roots levels necessitate the human resource management functions and activities to be conducted and shared (specifically splintered) harmoniously amongst various government agencies and personnel.

I. INTRODUCTION

Employee acquisition in local government authorities in Tanzania has always been centrally managed, administered and controlled. Over the years, the function was directly managed and controlled first by the central government ministries responsible for manpower allocation and professionalized works or fields. Second, employee resourcing was conducted by the centralised employment agencies or departments established by both the ministry responsible for human capital development and the ministry responsible for local governments including the establishment of the grassroots employment/recruitment boards and appointments committees responsible for resourcing of the specified types of staff categories in respective local government authorities.

Third, the employee acquisition was further (re-)centralized. With the creation of the public employment agency which resulted into the partial marginalization of the local government authorities employee resourcing functions to executing the overall employment planning and creating the proper employment environment climate for the residents in the specific local government authority. It is indeed, the overall jurisdiction of employee resourcing in the public service rests with the central agency called the Public Service Recruitment Secretariat (PSRS) whereas the Tanzania Employment Service Agency (TAESA) is mandated with the function of managing the employment climate in both the public and private sectors.

II. CONSTITUTIONAL AND LEGAL FOUNDATIONS

This section provides and outlines the human resource management function in Tanzania in the backing of the Constitution, laws and policies as the foundation of recruitment and selection practices in the Tanzanian public service. Human resource management function in the Tanzanian public service is highly centralized. It is the Constitution of the United Republic of Tanzania of 1977 which vests all management and human resource management functions in the public service to the President of the United Republic. He can execute all functions by himself particularly to senior positions within the public service. At the same time the Constitution mandates him to delegate to the public officers and the public service institutions to carrying out the human resource work on his behalf as stipulated under Article 35 of the Constitution. This human resource provision is stated both in Articles 35 and 36 of the Constitution; and in Article 79 of the Proposed Constitution (Tanzania, 2005 and Tanzania, 2015). The Articles provide for the legislature namely the National Assembly to enact human resource management laws for the effective management of human resource within the public service. However the performance of other institutions in the public service shall not bar the President from executing the personnel work which mandated him to perform by the Constitution.

Surprisingly, the Constitution gives the powers of executing the human resource functions including recruitment and selection to service commissions. The establishment of the Public Service Recruitment Secretariat (PSRS) in 2007) contradicts Article 36(3) of the Constitution.

The Public Service (Amendments) Act (Number 18) of 2007 stripped off the constitutional powers of the service commissions to perform the human resource management functions and it created legally but unconstitutionally the Public Service Recruitment Secretariat in their stead.

It was envisioned that the vision of the public service reforms in Tanzania was to have a smaller, affordable, well compensated, efficient and effectively performing public service. One of the methods to achieving this vision is to control and manage recruitment and selection from the centre rather than devolving the function to sub national entities. It is stated that there is '... (T)he restoration of control over employment levels through tighter recruitment policies and controls...' (Halfani, 1998:58). On the other hand, the Public Service Act (Tanzania, 2002) provides that the main authority in managing human resource and administration of the service rests with the Chief Secretary.

Section 4 of the Act gives specified powers to the Chief Secretary to manage the whole of the service, implement and coordinate the human resource functions specifically confirmation of staff, training and development, performance management, manpower control and monitoring, and employee relations. It is also provided in section 8(2) that the Chief Secretary shall be assisted by the Permanent Secretary (Establishments) who shall be the main formulator, custodian, promulgator, enabler, monitor and evaluator of all major human resource laws (soft and hard), policies, schemes, regulations and procedures in the public service. Furthermore, the Permanent Secretary (Establishments) has been empowered with other management related functions namely personnel research and management issues related to remuneration, job analysis, evaluation and design including the implementation of organization development issues in the public service as outlined in section 8(3) of the Act.

The human resource management functions are further provided and explained under section 21 of the Act. It states that the President may delegate and authorize any public officer to perform the functions. The delegation cum authorization of such functions does not preclude him from doing the same or similar management and human resource management functions simultaneously and concurrently.

III. RECRUITMENT AND SELECTION FUNCTION IN THE PUBLIC SERVICE

A decade after the independence of Tanganyika (1961 – 1963) and later the newly united Tanzania (after 1964) the public service in the country had experienced her ‘golden era’ in terms of its quality and observation of the traditional Weberian principles of managing organizations. Lumbanga (1995) and Baguma (1992), Kumburu (2009) hailed that the Service had attained the positive achievements in terms of the profession and career development within the public sector. However, Blunt and Popoola (1985) and Oyugi (1990) state that public services in Africa have been influenced by colonialism particularly at independence. The traditional systems of administration were undermined and any remnants of them were substantially disorganized through the introduction of the new forms of organizations and relationships namely the Weberian or the western type of organisation. The public service organizations had developed some professional loyalties, emphasized on rational values, tendency to adhere to formal rules, routines and procedures and it had the law and order orientation which enforced uniformity and consistency across the public service without considering the regional, geographical and tribal variations across the country. It is argued, on the contrary, that ‘public services in Africa have

performed poorly in terms of systems maintenance and transformation’ (Oyugi, 1990: 70).

In some cases the colonial public service in Tanganyika had the very different picture. The administration was hostile so as the performance of human resource activities. For instance, Swai (1980) stated that every white person in the German colonial Tanganyika had with a whip in his office in order to discipline black imperial civil servants. Recruitment and selection function was carried out under what was called the forced labour (Mbonile, 1996).

Tanzanian public service in the past four decades is claimed to have no clear policies and procedures for recruitment and selection (Kumburu, 2009; Egbert et al, 2009; Mcha, 2012 and Mwasha, 2013). The country inherited the public administrative system from the British colonial government in 1961. After independence in 1961 Tanganyika public service administration was managed by the issuance of administrative orders, circulars and directives. The instruments were issued by the technical ministry responsible for manpower administration and development. The Permanent Secretary (Establishments) issued different instruments to all public service institutions regarding human resource management activities and procedures including on recruitment and selection when the need to do so arises.

Prior to 1980 Tanganyika (later Tanzania) had experienced the critical shortage of human resource to man various positions in the public service. At independence the actual number of national civil servants was inadequate in terms of quantity (number) and quality of staff. Milanzi (1993) cited Pratt (1976) that Tanganyika at independence had only 299 civil servants holding various administrative positions. He stated that only seven of these were Tanganyikans. The public service fell short of (skilled) public servants almost in every department of the Government. It was also found out that the shortage of human resource was felt in both the public and private sectors in Tanganyika (from December 1961 to 1963) and in Tanzania (from April 1964 to 1980).

The critical shortage of public servants was felt from the German colonial period as well. Table 1 indicates the size of the distribution of civil servants in 1914. Milanzi (2008) states that there were 311 central administration staff employed during the German colonial Tanganyika in 1913. Out of whom there were 51 non Whites employed as civil servants. This was just 16.4 percent of total public employees that were in the service of the German colonial administration in Tanganyika. Table 1 also indicates the distribution of civil servants by occupational category. There were no specific pieces of information which spelt out how the candidates were recruited and selected and what government ministry or department was responsible for hiring the government’s staff.

Table 1 Public servants employed during the German colonial administration in Tanganyika in 1914

Occupational Unit	Whites	Non Whites	% of Non Whites Total	Staff
General administration	23	4	14.8	27
Justice	12	0	0	12

Finance and supplies	39	1	2.5	40
Customs	17	40	70.1	57
Medicine and \Veterinary	21	1	4.5	22
Central police	23	0	0	23
Ports and Public Works	32	0	0	32
Forestry	6	0	0	6
Survey	5	0	0	5
Agriculture and Geology	11	3	21.4	14
District administration	47	0	0	47
Teachers	8	0	0	8
Postal services	16	2	11.1	18
Total	260	51	16.4	311

Source: M.C.Milanzi (2008, page 12); improved from L.H.Gann and P. Duignan (1977) *Rulers of German East Africa 1884 – 1914*, California: Stanford, page 72

It implies that all senior and middle level positions in the service were manned by the non citizens namely the Asians and Europeans (Table 2). From the early and late 1960s the Africanisation (Tanganyikanisation) of the service had significant impact on the size and quality of the service. The ministry responsible for manpower development was then preoccupied with manpower allocation rather than recruitment and selection of candidates. The graduates from institutions of higher education were directly placed and employed from the colleges with the help of the National High Level Manpower Allocation Committee (NHLMAC). The Committee was also empowered to assess human resource needs of the country and to set the human resource priorities for the public service, among other functions.

In the 1980s the separate recruitment and selection institutions were established to assist the President in the ministries, independent departments and government agencies (MDAs) to carry out the designated personnel functions. The created institutions were the Civil Service Commission (CSC), Local Government Service Commission (LGSC), the Standing Committee on Parastatal Organisations (SCOPO) and the Special Committees for Employment (SCoFE) popularly known in Kiswahili as '*Kamati Maalumu ya Uajiri Serikalini*' (KAMUS). In addition, the chief executives of the public owned companies and parastatal organizations were granted some specified powers to recruit and select the middle and lower cadre officers in their respective institutions.

Table 2 Civil servants employment status at independence of Tanganyika by race and profession

Profession	African	Asian	European	Total	% of	
					African	the Total
Architects			0	2	9	11
Civil engineers			1	22	61	84
Mechanical engineers			0	6	46	52
Surveyors			1	1	92	94
Physicians			16	60	105	184
Lawyers			2	11	44	57

Veterinarians	9	1	35	45	2
Geologists	0	0	41	41	0
Zoologists	1	0	11	12	8.3
Total	30	103	447	580	5.2

Source: M.C. Milanzi (1993, page 4) with improvements from C.Pratt (1976) *The Critical Phase in Tanzania 1945 – 1968*, Cambridge: University Press, page 93

This function, recruitment and selection, is the monopoly of the central government since it is the primary and sole function of the President. The President is empowered by the Constitution to perform seven key human resource functions namely organization development, recruitment, selection, placement, promotion, termination and employee relations especially disciplinary issues of the (senior) public servants. These activities are constitutionally delegated to the service commissions and any other officers employed in the public service. The Public Service Act has delegated the President's human resource activities to the Chief Secretary, Permanent Secretary (Establishments) and the Public Service Commission. It was in 2007 when the Public Service Recruitment Secretariat was established, which automatically resulted to the deprivation of the recruitment and selection function formerly performed by Public Service Commission (2002 to 2008), Recruitment Boards from 2000 to 2003, Appointment Committees (from 2000 to 2003) and Employment Boards (from 2003 to 2008) in the LGAs. It was then the PSRS administratively empowered to do the recruitment and selection function in collaboration with other public service institutions (appointing authorities) or departments authorized to support services related to hiring of staff (Tanzania, 2008).

The initial eleven functions of the Public Service Commission (PSC) which were provided in the Act in 2002 - some of the functions were deliberately removed from the list through the amendment legislation including the Schemes and Service Regulations (Tanzania, 2007; 2003a and 2003b). The Commission was remained with the un-implementable, ambiguous, general and possibly conflicting and overlapping functions of assisting and advising the President on various personnel matters excluding hiring ones and included the ambiguous function of overseeing performance of the public service executives and institutions, and calling them to explain their unsatisfactory performance statuses, if happen. It is clearly understood that the Constitution and the Public Service Act insulate the President from picking or not taking any piece of advice from any person or institution. This implies that any piece of advice submitted to the President by the Commission does not compel him to consider or to take such a decision.

There is no obligation imposed to the President to consider any piece of advice or recommendation brought to him by any person or institution. The remaining functions of the Commission do not allow the Commission to do the prior designated human resource functions except to perform some specified quasi judicial decisions resulting from employee relations appeals. The hearing of appeals by the Commission can also be legally performed by the Commission for Mediation and Arbitration (CMA), the Labour Commissioner, labour officers and the labour court. Furthermore

staff councils, workers councils, wage boards, Labour, Economic and Social Council (LESC) and the Labour Court are performing similar or the same administrative and quasi judicial functions they have been mandated to perform by the respective legislation (Tanzania, 2003a; 2004a and b).

IV. RECRUITMENT AND SELECTION IN LGAS

The hiring of staff in the Tanzanian local governments was never considered of any importance compared to the central government considerations for over two decades. The President of the United Republic assisted by the ministry responsible for manpower development and the special committees and persons authorized to carry out the function up to 1982 were preoccupied with manpower allocation (distribution) and the provision of limited recruitment and selection activities mainly to central government units and departments. It was then the ministry responsible for manpower transferred some civil servants to work in local government authorities. The transferred or seconded staff had options to remain in their new service or serve for some time before they were then returned to their former service. This situation changed when in early 1980s when the local government legislation were re-enacted. The former local government laws were abolished in 1972 in favour of the decentralization programme (deconcentration) which lasted for a decade only (from 1972 to 1982). The new laws practically separated the local government service from the traditional civil service offered by the ministries and the Civil Service Commission. The laws created new institutions responsible for carrying out human resource management functions. The new institutions were the reformed Civil Service Commission (CSC) in 1989, Local Government Service Commission (LGSC) in 1982, SCOPO in late 1970s, the chief executives of the public corporations and the Special Committees for Employment (SCoFE / KAMUS). It was during the same period (decade) the Constitution of the United Republic of Tanzania of 1977 recognized the local government authorities as the creatures of the State by the 1984 constitutional amendments. Article 145(1) of the Constitution creates the local government authorities in Mainland Tanzania.

It was then the Local Government Service Commission (LGSC) actively participated in human resource management functions affecting mainly the top management staff of the councils and the local government institution as a whole till its abolition in 2002. This Commission was replaced by Public Service Commission inasmuch as the Public Service Act, (Number 8) 2002 repealed the Local Government Service Act Number 10 of 1982. Similarly the Civil Service Commission was abolished in 2002. It implied that the Public Service Commission

is the product of merging of the different government service commissions and government's employment agencies including the Civil Service Commission, Local Government Service Commission and SCOPO, among others. It was in January 2009 the designated human resource management functions, which were carried out by the Public Service Commission (PSC) were transferred to the Public Service Recruitment Secretariat (Njovu, 2014; Herman, 2013; Kiwara, 2015 and Mongi, 2015).

The period between 2000 and 2002 the LGSC worked together in the councils with the then Recruitment Boards and Appointments Committees created by the Minister responsible for local governments. The Committees and Boards dealt with category C and B staff respectively whereas the LGSC was responsible for Category A staff hiring and other human resource management services (Tanzania, 2000; 2003a). From 2003 the Employment Boards were established by the Public Service Regulations that finally dissolved the Recruitment Boards and the Appointments Committees in the councils.

V. THE NATURE OF RECRUITMENT AND SELECTION FUNCTION IN LGAS

This section provides the nature of the employee acquisition and resourcing in local government authorities in Tanzania mainland. There is need to avoid the erroneous conclusions previously made on the nature of human resource management set ups and systemic performance in LGAs (Njovu, 2014; Lameck, 2015; Mongi, 2015; Kiwara, 2015 and Kumburu, 2009). For example, Njovu (2014) claimed that the complete recruitment and selection in LGAs in Tanzania collapsed in 2009 when the public service recruitment agency namely the Public Service Recruitment Secretariat [PSRS] was established. However, recruitment and selection in this chapter (article) in LGAs should be looked at two different angles. In the first place it is important to understand the key principles which underpin LGAs' functioning in relation to central agencies. This thinking or angle can assist us to conclude whether the particular function performed by the LGA is re-centralised, decentralized, deconcentrated, delegated or devolved. The proper understanding of central - local relations in this article helps to contextualize recruitment and selection function in LGAs in relation to the mandates provided to them by the Constitution, related policies and legislation. Second, it is important to understand the key D by D principles regarding the provision of services in LGAs within the policy implementation framework of decentralization by devolution (D by D).

The key principles which underpin local governance functioning and change (reform) in relation to central agencies in Tanzania are two. The first principle is called subsidiarity whereas the second one is called holism. The subsidiarity principle in Tanzania refers to '... decentralization of the public service provision linked to devolution of political powers to lower levels as far as possible and feasible...' (Tanzania, 1998: 15). The principle lets the local government authority possess the discretionary powers when carrying out the planning, budgeting, administration and organization of service delivery in their respective areas of jurisdiction. The principle requires a changed central-local relations with the system of local government authorities that administratively is not subordinated to central

government agency system. In other words the principle demands that local government authorities are to be '... allowed to decide and implement all kinds of activities which are not in conflict with higher local government level and which serve general welfare purposes (ibid.: 14).

This definition by the Tanzanian Government outlined in the Policy has some limitations since it is less precise. Endo (1994) advises that subsidiarity must be looked and defined by identifying two distinct concepts namely the negative and the positive concepts. In the negative concept subsidiarity implies the limitation of competences of the higher organization in relation to lower entity. On the other hand, the positive concept refers to the possibility or even the obligation of intervention from the higher organization. The negative concept means that 1) the higher organization cannot intervene if the lower entity can adequately accomplish its aims, or 2) the higher organization should not intervene if the lower entity alone can accomplish its functions, or 3) the higher organization cannot intervene if it is not assigned to perform the functions. On the other hand the positive concept of subsidiarity implies 1) the higher organization can intervene if the lower entity performs inadequately its aims, or 2) the higher organization should intervene if the lower entity alone cannot accomplish its aims, or 3) the higher organization can or/and must intervene if assigned to do so. Hence, the understanding of the principle of subsidiarity in the *Policy Paper on Local Government Reform* does exhaust neither the negative nor the positive concepts described by Endo (1994) since the levels of adequacy and assignment of tasks among entities are not clearly precise. The only explanation which has been shown in the Policy is that local government authorities should not administratively be subordinate to central agencies. Another principle which guides the central – local relations in Tanzania is holism. The local government system in the country is required to observe the holistic principle. The councils' functions must assume and be seen as a whole and thus perform all functions assigned to them in their respective areas of jurisdictions. They have to plan, to budget, to carry out local administration and organization including the delivery of services such as education and health. Furthermore, the councils are to be multi-sectoral, which implies that all institutions delivering services in the council must be accountable to the respective local government authority (Tanzania, 1998). It implies that the LGAs are the highest political authorities within their jurisdictions defined within the national legal and constitutional framework. Thus recruitment and selection function must be looked at in the context of the national legislation and policies which guide the operation of the function.

The second area which this chapter (article) dwells is the decentralization of services in Tanzania. It is the policy option taken by the Government with regard to delivery of services in LGAs This decentralization of services is popularly called the 'decentralisation by devolution' or it is shortened 'D by D.' The implementation of D by D in LGAs means three things: 1) All public services affecting a large number of people should be provided through organs accountable to the LGA in its respective jurisdiction; 2) Certain public services for which local authorities are presently responsible may be delegated to organs (private sector, service boards that are accountable to LGAs; and 3) The

accountability and closely and tight controlled mechanisms for these delegations should be regulated to ensure some uniformity across sectors (Tanzania, 1996;1998).

Evidence of recruitment and selection in LGAs in Tanzania from previous studies

This section provides the evidence of the carrying out of recruitment and selection function in local government authorities in Tanzania. The studies conducted by Herman (2013) and Mongi (2015) in Ilala Municipal Council and Mbeya District Council respectively confirm that human resource management functions are neither centralized nor decentralized. The functions are divided or splintered/sliced between the central agency (that is the PSRS) and respective local government authority. For instance, Herman (2013) conducted the study on the roles played by different agencies during recruitment and selection in Ilala Municipal Council in Dar es Salaam region in Tanzania. He found out that despite the fact that the Government Policy stating that the HRM function be devolved but in practice the activities were splintered between the PSRS and the councils. He had 67 respondents clustered in three categories namely the policy makers (Councilors) who were 14.9 percent, local government employees (79.1 percent) and the council residents (citizens) who represented 6 percent of the respondents. Approximately seventy three percent (73.1) of respondents were females with varied educational qualifications and backgrounds. It was noted that only 4.48 percent of respondents were unaware of the presence of recruitment and selection activities in the Municipality.

Mongi (2015) conducted the qualitative study in Mbeya District Council in Tanzania with regard to the feelings and perceptions of different stakeholders (respondents) particularly to the carrying out the recruitment and selection function in the Council. There were 27 respondents selected in the study characterized with the majority age group between 18 and 49 (85.1 percent) whereas

70.3 percent of the respondents with university/college education qualifications. It was felt that the human resource management functions in general and recruitment and selection function in particular is centrally managed by the Government of Tanzania. The need for centralization was prompted by the Government's intention to eradicate corruption, maladministration, unethical behaviours and mal-HRM practices in the LGAs. It was found out that the Policy intent of devolving powers to the councils promulgated by the reform programmes were partly rescinded.

Sliced or splintered recruitment and selection function

Recruitment and selection function in LGAs in Tanzania is not managed by LGAs alone. The activities underlying recruitment and selection are shared between the central employment agency (PSRS) and the local government authority concerned. It is a splintered function with communication, coordination and close cooperation between the centre and the periphery. Table 3 summarises the phased exchange of tasks and HR activities in respect to recruitment and selection between the council and the PSRS.

Table 3 Splintered recruitment and selection activities performed by the Council

Phase	Recruitment and Selection Activity	Institution Doing the Activity
Pre-recruitment	Preparation of HR plan of the Council	LGA
	Preparation of career plan of the Council	LGA
	Preparation of HR audits	LGA
Recruitment	Preparing the electronic Annual Job Budget by the help of HCMIS - Lawson	LGA
	Making the electronic Job Budget Inquiry (Lawson)	LGA
	HR Requisition	LGA
	Inviting Applications	LGA
	Advertisements	PSRS
	Receiving applications	PSRS
	Shortlisting	PSRS
	Applicant's tracking	LGA

	Applicant's education	LGA

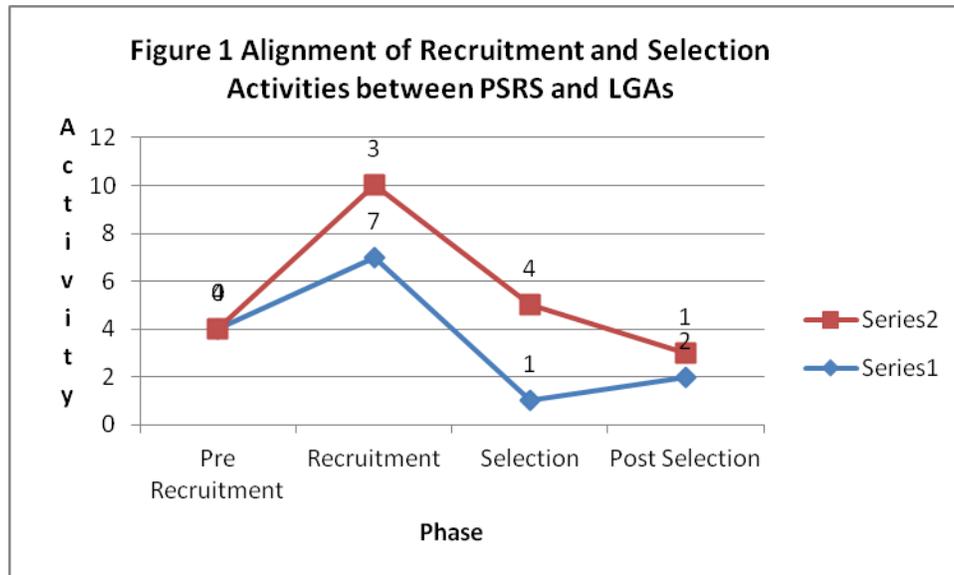
	Applicant's certification	LGA
Selection	Inviting applicants for selection	PSRS
	Conduction selection interviews and tests	PSRS
	Examining the applicants' scores	LGA
	Actual selection	PSRS
	Posting the successful applicants	PSRS
Post selection	Placement	PSRS
	Employment	LGA
	Employee retention, development, relations and termination	LGA

Source: M.C. Milanzi, (2013) Recruitment and selection processes in Public Service Institutions in Tanzania, *Unpublished Report*, Mzumbe University; also cited by Herman (2013: 35)

From the summary presented in Table 3 one can understand that there are 21 activities associated with recruitment and selection performed in and for LGAs. Thirteen activities (61.9 percent) are performed by the council (LGA) whereas thirty eight point one percent of the activities are performed by the Public Service Recruitment Secretariat. It is clear that more than half of recruitment and selection activities in the councils are performed by the councils themselves. The activities are shared between the central government agency and the councils.

Figure 1 shows the pictorial representation of sharing of the activities between the councils and the central employment

agency in Tanzania. It indicates that there is a perfect alignment of activities when performing the recruitment and selection in LGAs. Series 1 data depicts the LGAs doing the recruitment and selection whereas Series 2 data in the Figure indicates the the central employment agency roles and activities. Some researchers and writers judge that the central government has hijacked the devolution in the LGAs and thus the HRM functions have been centralized (Njovu, 2014, Mongi, 2015, Lameck, 2015 and Kiwara, 2015). This allegation does not have the objective basis for such a claim.



Source: M.C. Milanzi, (2013) Recruitment and selection processes in Public Service Institutions in Tanzania, Unpublished Report, Mzumbe University

VI. CONCLUSION

The article confirms that human resource management function in the public service in Tanzania does not rest in one government institution. The execution of the functions is shared among different public service personnel and institutions. With specific reference to recruitment and selection it was observed that the function is shared between the central employment agency and the councils. Furthermore, the historical account of the function shows that the President of the United Republic of Tanzania takes part in undertaking the function particularly top government positions. He is the overall in charge of all HRM functions. The activities of recruitment and selection in LGAs are shared between the central employment agency institution and the individual LGA where the LGAs play the key role (over 60 percent) during recruitment and selection.

Hence, decentralization of the LGAs envisioned by the Government has rested on the two principles outlined and the general need of the Government to delivery services up to the grass roots levels. In some balanced way the Government has substantially devolved recruitment and selection function to local government authorities. The studies cited in this article show that there are no mixed or skeptical reactions pertaining to the splintered nature of executing the function. The balancing is indeed, the way of balancing the central agency intervention at the same time understanding the magnitude of assignment the centre is legally provided to intervene the affairs of the LGAs.

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Factors Affecting Ethics And Anti-Corruption Commission On Performance Of Procurement Personnel In Trans-Nzoia County, Kenya

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Abstract: This study focused at the area of ethics and anti-corruption commission on performance of procurement personnel in Trans-Nzoia County, Kenya, the specific objectives were; integrity of staff, transparency and accountability, information and Communication technology and government policies respectively. The researcher used descriptive research design for this study. The target population was 150 respondents. The researcher did a census survey, where purposive sampling techniques was used. Since the respondents were with similar experience, exposure and skills. The research instruments were pilot tested first for reliability and validity, where 10% of the respondents were issued with the questionnaires before the actual collection of data and analysis and presentation.

Keywords: integrity of staff, transparency and accountability, information and Communication technology and government policies on performance of procurement personnel

1.1 Introduction:

According to Anti-Corruption and Economic Crimes Act of Banerjee et al.(2019), corruption means an offence that involves bribery, fraud, embezzlement or misappropriation of public funds, abuse of office, breach of trust; or an offence involving dishonesty- in connection with any tax, rate levied under any Act; or under any written law relating to the elections of persons to public office (The Anti-Corruption and Economic Crimes Act Beaman, and Magruder (2012). Professional ethics is about managing relations which is a crucial part in SCM. Successful companies use supply chains not only to reduce cost and complement the product but also to nurture long-term value added associations. A wide range of stakeholders are interested in the social, ethical and environmental performance of the government's supply chain. Globally corruption has had an effect on many different bodies and institutions two of the major bodies affected by corruption are the Government and its Public Institutions. In the long run, no country can afford the social, political or economic costs that corruption entails. It erodes public confidence in political institutions and leads to contempt for the rule of law; it distorts the allocation of resources and undermines competition in the market place; it has a devastating effect on investment, growth and development .In Europe corruption remains a major challenge to democracy and the rule of law .According to the widely used Worldwide Governance Indicators and Quality of Government EU Regional Data survey Hungary ranks as one of Central and Eastern Europe's most corrupt countries (Beaman, BenYishay, Magruder & Mobarak, 2015).

There is strong consensus among researchers and practitioners regarding the strategic importance of developing efficient purchasing techniques to increase transparency and fairness, reduce corruption, ensure competitiveness and reduce costs. An increasing number of government and non-government authorities are adopting ethics and anti-corruption commission solutions to reap the above stated benefits. In a greatly competitive business environment, organizations are required to manage their supply chains adequately to ensure efficiency in operations (Beaman et al., 2012). Companies need to adequately link their operations with their supply chain partners such as suppliers distributors, wholesalers, retailers and end customers so as to improving the performance of the organization Supply Chain Administration (SCM) refers to the integration of key business development from end use through original suppliers that provide products, services, and information that adds value for customer and other stakeholders. The vision of the supply chain as a holistic construct with close cooperation between the different organizational units has replaced the traditional picture of it as a collection of vertically organized purposely units (Banerjee, Chandrasekhar, Duflo & Jackson, 2019).

1.2 Statement of the Problem

In spite of the reforms carried out in Public Procurement in Kenya, the performance of procurement personnel have not fully achieved the objectives of integrity of staff, transparency and accountability, information and communication technology and government

policies. Public procurement related malpractices were estimated to have cost the country over Kshs.700 billion. State organizations are under greater scrutiny on Factors affecting Ethics and Anti-Corruption on performance of procurement personnel, not just the input and output but the whole operation in terms of transparency and accountability, ICT adoption, and integrity (Irungu, 2010). However this research project observed the need to adopt approaches for better procurement performance and the need for supply chains to be rapid, adaptable and aligned. There was need to do a study in the Kenyan context so as to validate its findings before coming up with a general consensus (Osoro et al., 2015). The factors affecting Ethics and Anti-Corruption Commission on performance of procurement personnel has insufficiently been addressed, with a documentation of no association most parastatals and government organizations procurement development are difficult to enforce as integrity is lacking (Mbae, 2014). This has left an evident knowledge gap, which the study intends to bridge by determining the Factors affecting Ethics and Anti-corruption Commission on performance of procurement personnel using integrity of staff, transparency and accountability, information and communication technology and government policies (Muange, 2013). Therefore there is need to do a study in the Kenyan context so as to bridge the existing gap using the new knowledge.

1.3 Integrity of Staff: Ethics often brings several stakeholders in the global supply chain together, creating informal institutional structures through which a dialogue can be established. This dialogue, and the mutual trust that it helps create, stands in contrast to the adversarial associations that often existed previously (Telewa, 2014). Breaking down these barriers can bring several benefits because regulatory systems based on trust and dialogue seems to outperform those based on confrontation (Solomon & Ayebale, 2017). Flows of information and knowledge can be improved, thus reducing costs, because far more data is shared in situations of trust (Abdul-Rahamon & Adejare, 2014). Trust also enables the system to be more flexible it can learn and adapt more readily than system based on more formal organizational boundaries, and it can draw on resources whenever they reside within the system. Ethical issues concerning producers are key considerations in the supply chain Administration. Service providers are confronted with a plethora of ethical subjects such as child labor, fair working conditions, fair wages, the ecological sustainability of their production methods, intellectual property right violations and counterfeits, to name just a few (Schmidt, 2017). However, despite the unethical, unjustifiable and degrading nature of child labor the problem is exacerbated when sub-contractors involve children in provision of goods or services to the company (Solomon & Ayebale, 2017).

1.3.1 Transparency and Accountability: Professional codes of conduct generally are written in broad conceptual terms rather than in specific situational or descriptive terms. They leave room for interpretation and often may seem ambiguous (Solomon & Ayebale, 2017). Procurement professionals cannot abide merely by the letter of the law or the specific words in any code, but rather, they are guided by the spirit of the law or the broader concept that the code is intended to express. Organizations and professions often seek to address standards of conduct through the adoption of codes of conduct. According to , one reason why many procuring organizations avoid detailed and specific codes is these may give the impression that anything not prohibited is permitted or that anything not specifically addressed is not important (Simiyu, 2016). People in other professions who have not been trained in or are not appreciative of procurement ethics may not realize that a situation not specifically identified in the code may still be vitally important (Simiyu, 2016). Those who do not understand the foundation of a general requirement may not be able to apply a code in a specific situation. Therefore accountability comes in play for those procurement professionals who understand the code of ethics. No matter how hard policy-makers try, they would never specify in law, code, regulation, rule, or other written requirement everything that a procurement officer needs to know regarding what is allowed or appropriate and what is prohibited or shunned (Schmidt, 2017). It is necessary for procurement officers to understand what the law or rule is intended to accomplish. The United Nations Oath of Office clearly expresses the UN's values, principles, rules and regulations and how procurement officers should regulate their conduct and perform their duties within the interests of the UN. The respective FRR guiding the procurement process of the UN organizations also address several ethical values such as fairness, integrity, transparency and equal treatment. Purchasing and supply Administration professionals should encourage colleagues to declare any material personal interest which may affect, or be seen to affect, their impartiality or judgment in respect of their duties (Shiferaw, 2015).

1.3.2 Information and Communication Technology: In the recent past, Government organizations have increasingly come to realize that public agencies must utilize Information and Communication Technology, to enhance procurement development in public sectors (Schmidt, 2017). The use of ICT is a key component, governments have to utilize it during development process of stimulating the economy, lowering existing digital gaps, modernizing public sector and improving government performance as it is evidenced by use of IFMIS. ICT helps in reducing opportunities and incentives for fraud and improves the quality of Government agencies procurement Administration, including monitoring and decision making, thus encouraging private industries in the public market to participate competitively (Shiferaw, 2015). From a business perspective, implementing scalable communication infrastructures such as wide area networks, accommodating various types of Government Agencies requires a day to day basis that has a provision of broad band internet access, online services, internal collaboration, and Administrative data handling (Alatas, Banerjee, Chandrasekhar, Hanna & Olken, 2016). Information and communication technology on the performance of procurement personnel towards the Trans nzoia County in Kenya (Schmidt, 2017). The disadvantaged groups use ICT purposes provided by computer hardware and software on equal basis with others. Generally, increase of availability to easy accessibility of ICT, a positive step has been done, removing

barriers preventing people with disabilities from participating equally in society. The use of public procurement to further social goals is still very much attached on ICT accessibility & implementation. Ways of ICT accessibility criteria are applied to the purchase of ICT especially by National governments. Procurement system “ Buy accessible wizard” enables ICT purchases by federal government authorities to be tracked and checked. This category of ICT is mostly applicable in USA and Japan; where Japan market has been flooded by this product (Shiferaw, 2015).

1.3.3 Government Policies: Kenya’s General Penal Code (GPC) criminalizes the act of giving and receiving a bribe, abuse of office, trading influence, and fraud. Individuals and companies are criminally liable, and bribery between business Kenyan and foreign public officials is forbidden. The Penal Code fails to adequately criminalize bribery of officials in foreign state-owned entities, and the obligation of officials to report foreign bribery is not clear. The GPC does not differentiate between bribes and facilitations payments (Schmidt, 2017). The legality of gifts and hospitality depend on intent and benefit obtained, and if the act has led to an undue advantage or improper influence of a person’s decision making. A company can be held criminally liable and fined for corruption offences committed by persons acting on the company’s behalf (Shiferaw, 2015). Other legal anti-corruption regulations consist of codes of conduct for government staff and ministers to regulate conflicts of interest. Those affected by illegal activities are required to report them. The adequateness of corruption prevention by the national government is considered to vary by locality, and the level of transparency varies in proportion to administrative capacity. Kenya’s Criminal Code prohibits active and passive bribery, embezzlement, fraud, abuse of office, breach of trust, and abuse of insider information. It criminalizes bribery between businesses, of Kenyan and foreign public officials, and through intermediaries such as Ethics and Anti-Corruption Commission (Schmidt, 2017).

1.3.4 Performance of Procurement Personnel in Trans Nzoia County: Measuring the performance of supply chains has become vital for all organizations involved in disaster Administration This is particularly due to increasing competition in the sector for scarce resources and increasingly great demands from the public to improve visibility and accountability (Mwangi, 2014). Competitive bidding is a transparent process that invites all potential suppliers to a bid but may not be applied in the cases of great emergency procurement of aid due to time limitation. Secondly is reputation, which means the evaluation of a firm by its stakeholders in terms of their effect, esteem and knowledge. Unethical procurement practices in supply networks endanger the credibility of organizations. For instance, offer of gifts by contractors with a motive of giving bribes results in negative publicity which adversely affects the procurement achievement. Another objective is accountability which identifies who is responsible for the actions within the procurement process and how well the actions are performed (Owuoth & Mwangangi, 2015). Government ecosystem is made up of many different groups with different incentives and levels of commitment like the international community, made up of large and small aid agencies. To improve on accountability, conflict of interest aims at ensuring that assigning responsibility is not compromised on the basis of professional association with partners. Improved response time is another objective procurement performance; improved response time translates into speed and accuracy in delivering aid to the affected areas (Owuoth & Mwangangi, 2015). A successful procurement performance mitigates the urgent needs of a population with a sustainable reduction of their openness in the shortest amount of time. For example, ethical negotiation enables organizations combine purchasing requirements over a certain period of time (Lambert and Stock, 1993). In addition, ethical reciprocity enables the supplier and buyer obtain a great understanding of mutual problems thus increasing goodwill, whereas unethical reciprocity enables buyers use buying decisions to unsuitability enhance a sales opportunity (Schmidt, 2017).

2.1 Research Design

According to Kothari (2011), a research design is a set of methods and procedures used in collecting and analyzing of variables in this study. A descriptive research design was selected because it provides an accurate way of how qualitative and quantitative research design was combined to support each other. They researcher used numerical and words in explain the phenomena under this study. This design was chosen to meet the objectives of the study which was to determine the knowledge and views of to Tabachnick and Fidell (2013) they observed that descriptive best placed to investigate in depth a phenomenon that requires an exhaustive approach. Factors affecting Ethics and Commission On performance of procurement personnel in Kenya needed such an approach and this research design was therefore considered appropriate for the study. Target population according to Kothari (2011) refers to the entire group of individuals or objects to which a researcher is interested in generalizing the conclusions. The study was conducted in Trans-Nzoia County in Kenya. The target population for this study was 150 employees from the following departments: procurement, accounts and finance, maintenance, Nursing and orthopedic departments respectively.

The multiple regression model was used as follows;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon \text{ Where;}$$

Y= Performance of procurement personnel in Trans Nzoia County.

β_0 = Constants

β_1 - β_4 = Co-efficient of the Ethics and Ant-Corruption Commission

X₁= Integrity of Staff.

X₂= Accountability and Transparency.

X₃= Information and Communication Technology

X₄=Government Policies

ε = error term

2.1.1 Reliability Test

A pilot test to 15 respondents was conducted in Trans Nzoia County. The pilot study aimed at ensuring reliability through pretesting and subsequently predetermining whether the instruments could provide reliable data during the main study, as well as check clarity of the instruments to the respondents. Alpha values greater than 0.9 ($\alpha \geq 0.9$ is Excellent) can be considered excellent, $\alpha \geq 0.7$ but < 0.9 , considered good, $\alpha \geq 0.6$ but $\alpha < 0.7$ considered acceptable, $\alpha \geq 0.5$ but < 0.6 considered poor, while alpha values less than 0.5 ($\alpha < 0.5$) are considered unacceptable. This is in line with the findings of Kothari (2011). The study benchmarked its reliability test against these alpha values for all the variables under this study. This is in line with the finding of Mutua (2010). The results are presented in the table 2.1 below:

Table 2.1: Reliability Test

Reliability Statistics	Response	Cronbach's Alpha
Integrity of Staff	15	0.792
Transparency and Accountability	15	0.765
Government Policies	15	0.814
ICT	15	0.807
Performance of Personnel	15	0.741

2.2 Regression Analysis

To establish the degree of influence of integrity of personnel and performance of procurement personnel in Trans Nzoia County a regression analysis was conducted, with the assumption that: variables are normally distributed to avoid distortion of associations and significance tests, which was achieved as outliers were not identified; a linear relationship between the independent variables and dependent variable for accuracy of estimation, which was achieved as the standardized coefficients were used in interpretation. This is in line with the findings of Muange (2013). The multiple regression model was as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Policy and procedures in public entity = $\alpha + \beta_1$ (Integrity of Staff) + β_2 (Transparency and Accountability) + β_3 (Government policies) + β_4 (ICT) + error term.

Regression analysis produced the coefficient of determination and analysis of variance (ANOVA). Analysis of variance was done to show whether there is a significant mean difference between dependent and independent variables. The ANOVA was conducted at 95% confidence level.

2.3 Model Goodness of Fit

Regression analysis was used to establish the strengths of relationship between the integrity of staff and performance of procurement personnel in Trans Nzoia County (dependent variable) and the predicting variables; integrity of staff, transparency and accountability, government policies and information and communication technology (independent variables). The results showed a correlation value

(R) of 0.754 which depicts that there is a good linear dependence between the independent and dependent variables. This finding is in line with the findings of Njoroge (2013).

This is in line with the findings of Nyongesa (2014), who observed that this also depicted the significance of the regression analysis done at 95% confidence level. This implies that the regression model is significant and can thus be used to evaluate the association between the dependent and independent variables. This is in line with the findings of Acharya, Almeida and Campello (2013) who observed that analysis of variance statistics examines the differences between group means and their associated procedures.

Table 2.3 Model Goodness of Fit

R	R ²	Adjusted R	Std. Error of the Estimate
0.734	0.724	0.756	0.056

a. Predictors: (Constants), integrity of Staff, transparency and accountability, government policy and ICT

b. Dependent Variable: performance of procurement personnel

With an R-squared of 0.724, the model shows that integrity of staff, transparency and accountability, government policies, and ICT 72.4% of the variations on performance of procurement personnel in Trans Nzoia County while 27.6% is explained by other indicators which are not inclusive in study or model. A measure of goodness of fit synopsis the discrepancy between observed values and the values anticipated under the model in question. This finding is in line with the findings (Abdul-Rahamon & Adejare, 2014).

2.4 Analysis of Variance (ANOVA)

From the results in table 2.4, analysis of variance statistics was conducted to determine the differences in the means of the dependent and independent variables to show whether a relationship exists between the two. The P-value of 0.005 implies that on performance of procurement personnel in Trans Nzoia County have a significant relationship with Staff competency, compliance strategy, management style, and ICT which is significant at 5 % level of significance. This finding is in line with the findings Oluoch (2015).

Table 2.4 ANOVA Analysis

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.157	1	1.059	.431	.002
Residual	5.463	100	.494		
Total	10.610	101			

2.4 Regression Coefficients of Determination

To determine the relationship between the independent variables and the dependent variable and the respective strengths, the regression analysis produced coefficients of determination. Findings in table 4.16 reveal a positive relationship between the implementation of procurement policies and procedures in public entities in Kenya, king the regression model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon; \text{ where,}$$

Y= Public Entities

α = Constant; $\beta_1 - \beta_4$ = Beta coefficients; X_1 = integrity of staff; X_2 = transparency and accountability;; X_3 = government policies; X_4 = Information and communication technology and ε = Error term, from the result shown below, it's clear that when all the independent variables are regressed against the dependent variable the constant gives a negative result meaning there is a strong relationship and how each predictor has an effect on the dependent variable.

Recommendations

The study recommends and confirms that the on performance of procurement personnel in Trans Nzoia County was significant in enhancing policies and procedures in Trans Nzoia County in Kenya. That in future different counties needs to strengthen public-private partnerships policy and procedures in the procurement process to all counties in Kenya, so as integrity of staff, transparency and accountability, modern government policy and information and communication technology to be line with the on performance of procurement personnel in Trans Nzoia County. This study therefore sought to explore what past scholars had said on the influence of public –private partnership in on performance of procurement personnel in Trans Nzoia County and tested viability of best on performance of procurement personnel in Trans Nzoia County in Kenya. That from the foregoing, this study recommends that the best on performance of procurement personnel in Trans Nzoia County should strive to be proactive on how to perform better to retain integrity and improve integrity of staff, transparency and accountability, government policies and information and communication technology in Trans Nzoia county. The study has now bridged the existing gap with the creation of new knowledge.

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A Prospective Study On Therapeutic Management And Outcome Measures In Renal Failure Patients

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Abstract- Kidney is a vital organ of the body that plays a crucial role in filtering blood, removes including elimination of drugs maintaining fluid and electrolyte balance, releasing hormones to control blood pressure, stimulate red blood cell production, activating vitamin D to produce calcium leading to maintain bone health. Acute renal failure and chronic kidney disease are the two main conditions in renal failure. This study shows that managing of co morbid conditions hypertension, diabetes, coronary heart disease, congestive heart failure, left ventricular hypertrophy, infections, renal calculi, pulmonary diseases which are very essential in treatment of renal failure. The choice of treatment with balanced doses is prior in renal failure. **Objectives:** the main objectives are to understand and study the prescription-based drugs and dosage adjustment, Studying about the link between the disease progression and underlying causes, risk factors and also medication histories of patients for the possibilities. **Methods:** statistical analysis and parametric tests used based upon the requirement and evaluation. **Results:** patients with three or more comorbidities are subjected to morbidity compared to single. **Conclusion:** patients who are on long term therapy for cardiovascular diseases or neurological diseases are more likely to have renal failure and also the treatment for renal failure dosage regimens are individual, the outcomes depend upon the patient stage of renal failure.

Index Terms- comorbidities, treatment, renal failure

I. INTRODUCTION

Kidneys play vital role in filtering blood to maintain fluid and electrolyte imbalance along with removal of wastes such as processing of drugs, metabolic end products, regulates several body functions such as maintenance of blood pressure, initiation of red blood cell production, activating vitamin-D to maintain osseous system⁶. The rapid decline of normal kidney functions considered as renal failure, based on the abnormal kidney function renal failure is classified into two types i.e., Acute renal failure and Chronic kidney disease⁴. Acute renal failure (ARF) is a syndrome characterised by rapid onset of renal dysfunction, chiefly oliguria (urine output that is less than 1 mL/kg/h in infants, less than 0.5 mL/kg/h in children, and less than 400 mL daily in adults) or anuria (urine output less than 100ml/day) and sudden increase in metabolic waste-products (urea and creatinine) in the blood with consequent development of uraemia. In considering national and international guidelines defined CKD, diagnosed, staging according to the measures of kidney function in GFR

present for a period of 3 months or more, structural changes where normal kidney is replaced by parenchymal changes allows for a degree of risk stratification³. The long-term risk of CKD is not a single effect that is loss if kidney function but also the co morbid conditions like hypertension, diabetes, coronary artery disease, neurological conditions like stroke, abuse of NSAIDs and also the socio-economic deprivation mostly lie together to deteriorate the kidney function. The kidney function measures are the GFR rate, serum creatinine, urine output which are the main determinants also used for the staging and treatment². Hypertension (blood pressure) treatment indicated is a calcium channel blocker (amlodipine) which is best first line therapy in CKD and β -blockers also show a Reno protective activity showing a development of dysregulated sympathetic system¹. For diabetes sulfonylureas (glipizide, glimepiride) are safer compared to metformin preferred at any stage. Thiazolidinediones (pioglitazone, rosiglitazone) are much safer and effective in treating hyperglycemic conditions. DPP-4(dipeptidyl peptidase-4 inhibitors-alogliptin, linagliptin, sax gliptin and sitagliptin are recommended but require dose adjustments. Insulin is also recommended but in low doses based upon the glucose levels observed in patients. For infections during renal failure like sepsis then piperacillin and tazobactam are preferred with a half amount of normal dose. To treat pulmonary edema vasodilators, continuous positive airway pressure (CPAP) can be given, decompensated heart can be treated with IV-opioids (like diamorphine 2.5–5 mg, with care taken depending on the degree of respiratory distress) and an IV-infusion of nitrate (for example, glyceryl trinitrate 50 mg in 50 ml 0.9% saline). As for the acidosis condition in renal failure Reversing of acidosis is through administration of an alkaline solution—sodium bicarbonate, there by replaces and maintains the alkaline concentration and increases the intracellular tonicity. RRT (renal replacement therapy) is indicated in patient with ARF when the kidney function is completely reduced and so poor that life is at risk. RRT is considered as the last treatment option in renal failure which performs removal of toxins when symptoms aggravate like hyperuricemia, hyperkalaemia etc., removal of excessive fluid in conditions of unresponsive to diuretics like diuretic resistance, corrects the electrolyte and acid imbalances, controls the effect of sepsis (systemic infection).The common types of renal replacement therapy are: haemodialysis, peritoneal dialysis, hemofiltration, hemodiafiltration⁵.

II. MATERIALS AND METHODS

The study performed was a prospective study performed in-patient setting at nephrology unit where patients with chronic kidney disease and acute renal failure were considered. The data collected from patient reports on daily basis and their therapeutic outcomes were studied. The study was carried out at a tertiary care hospital for a period of 06 Months. A study population of 85 in-patients (n=85) of both genders together were considered with renal failure. In this population patients with chronic kidney disease were n=59 and acute renal failure were n=26. The study population consists of all stages of renal failure along with their co morbidities. Study Criteria included Patients with acute and chronic renal failure, patients with cardio and cerebro vascular diseases, patients with diabetes mellitus and hypertension, systemic infections, patients with medication abuse, patients with thyroid disorders, patients with kidney structural changes, patients with progressive kidney diseases and excluded Patients with renal calculi, gender is not a criteria, pregnancy and lactating women, smokers and alcoholic, patients with renal cysts, patients who are not willing to participate in the study. Other material were lab investigations data are Serum creatinine levels, blood urea levels, thyroid function tests, complete blood picture, urine analysis, ultra sound abdomen, CT-scan KUB, blood glucose and serum electrolytes. Methods followed were data management and statistical analysis the information and data obtained is managed by MS-excel format, graphical representation, comparisons of outcomes with duration of stay were analyzed by using one way-ANOVA and the unpaired t test was performed. The KDIGO (kidney disease improving global outcomes) and KDOQI (kidney disease quality initiative) guidelines were followed while considering the treatment to renal failure patients. To calculate and stage the patients according to their eGFR the formulas used were Cockcroft and gault equation and MDRD in chronic kidney disease patients.

III. RESULTS

In this study in-patients with renal failure were considered and their treatment was observed, outcomes were measured. The patients having acute renal failure, chronic kidney disease were taken into where total (n=85) patients with CKD (n=59) about 69.4%, ARF(n=26) about 30.5% [CKD-chronic kidney disease, ARF-acute renal failure] The patients taken were categorized depending upon the age but not on gender as kidney diseases are common in both male and female. The mean of CKD age group is 5.9 (average=60.2) and SD=3.725 where as $p(<0.005)$ Age group between 56-60 was found to be more effected found to be most affected with renal failure . The mean of ARF age group was 2.60 and SD=2.63 whereas the p value (0.0005). Patients with co- morbid conditions are observed with higher disease progression in case of renal failure which also leads to mortality. Patients with comorbidities (n=27) cardiovascular disease (CVS), infections (sepsis,glomerulonephritis, pyelonephritis) pulmonary disease (pleural effusions, asthma) are found to be 11(n=11/27) 40% are in risk of disease progression where as in ARF, patients with infections were found to be 8 (n=8/16) 50% are more in risk of diseassse progression when compared with other comorbidities. In together seen that patients with CVS associated diseases were commonly found to be at risk as well as patients with all comorbidities are in large number compared to individual co morbidities. **Figure 2** showing the eGFR rate in CKD and ARF patients without co-morbidity and with single, dual and tri or more comorbidities. It has been found that patients with no co morbidity patients are having varied eGFR 19.445ml/min among chronic renal failure patients which is significant $p<0.001$ which can be achieved to normal through hemodialysis, as for comorbid conditions associated decline in e GFR is irreversible and only leading to mortality. If seen in ARF, no comorbidity's e GFR is 11.1ml/min ($p <0.0005$) which is also temporary can be brought to normal after treated on hemodialysis as patient has no co-morbidities can prevent disease progression.

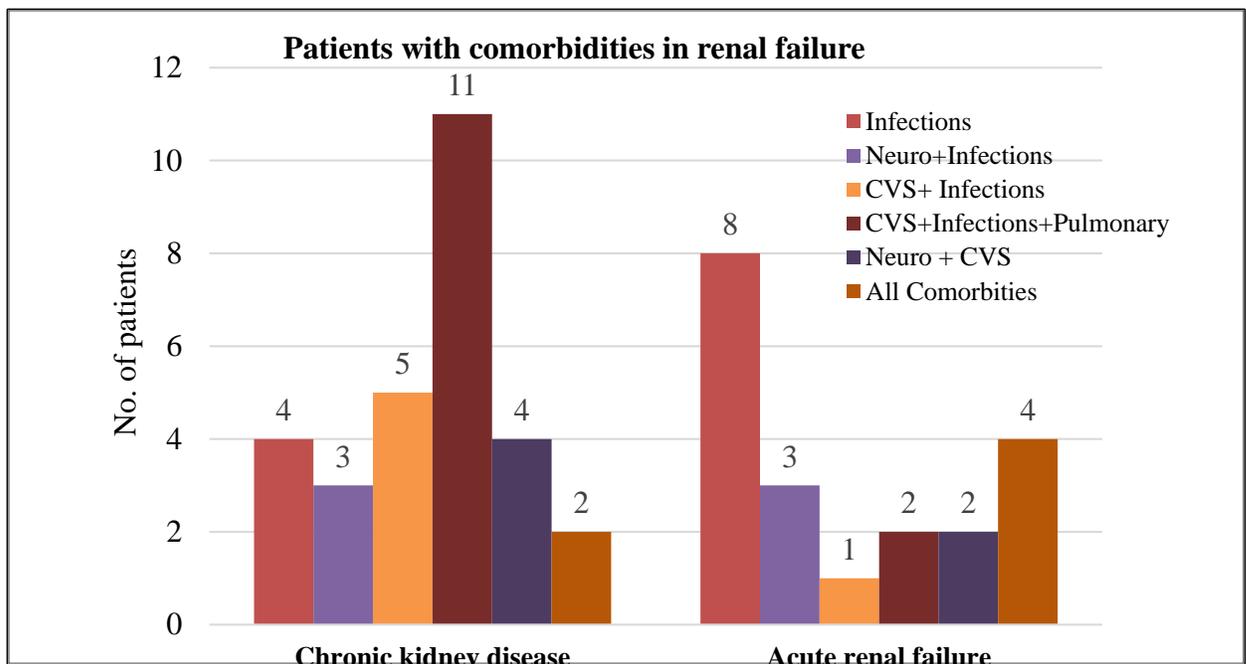


Figure 1: Patients with co-morbidities in renal failure

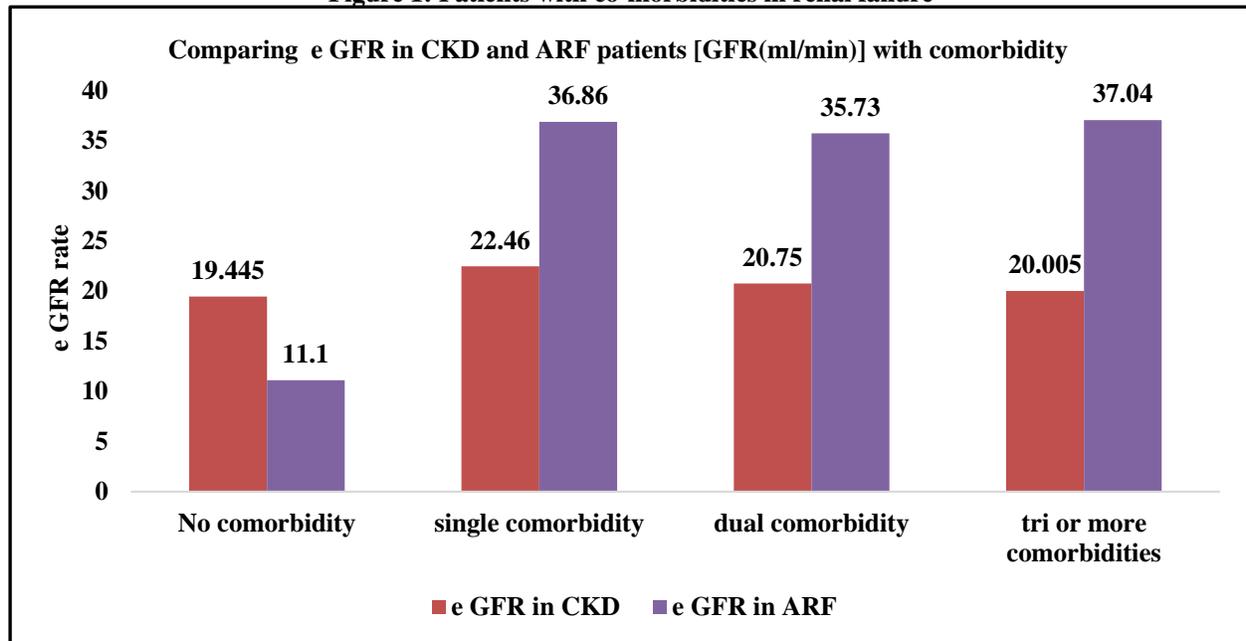
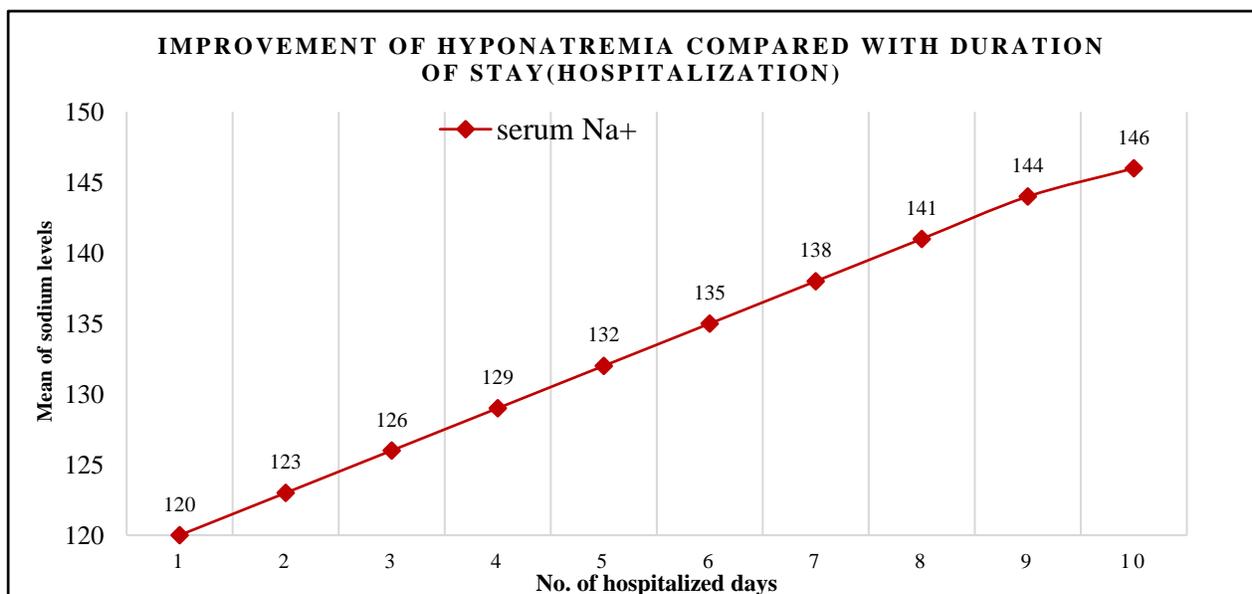


Figure 2: comparing e GFR (estimated glomerular filtration rate)of renal failure patients with comorbidies

Anemia is a common threat for all renal failure patients as kidney loses the function of producing erythropoietin. Treatment involves mainly human erythropoietin re-engineered darbepoetin 40mcg/kg per week. In this study(graph1) anemic patients(n=60) were treated with ESA (erythropoiesis stimulating agent) for six weeks i.e.,weekly once seen improvement about 3.3 g/dl of hemoglobin observed (p=0.0005)

Graph 1: improvent of hemoglobin levels in anemic patients after treated with ESA for on average 6 weeks

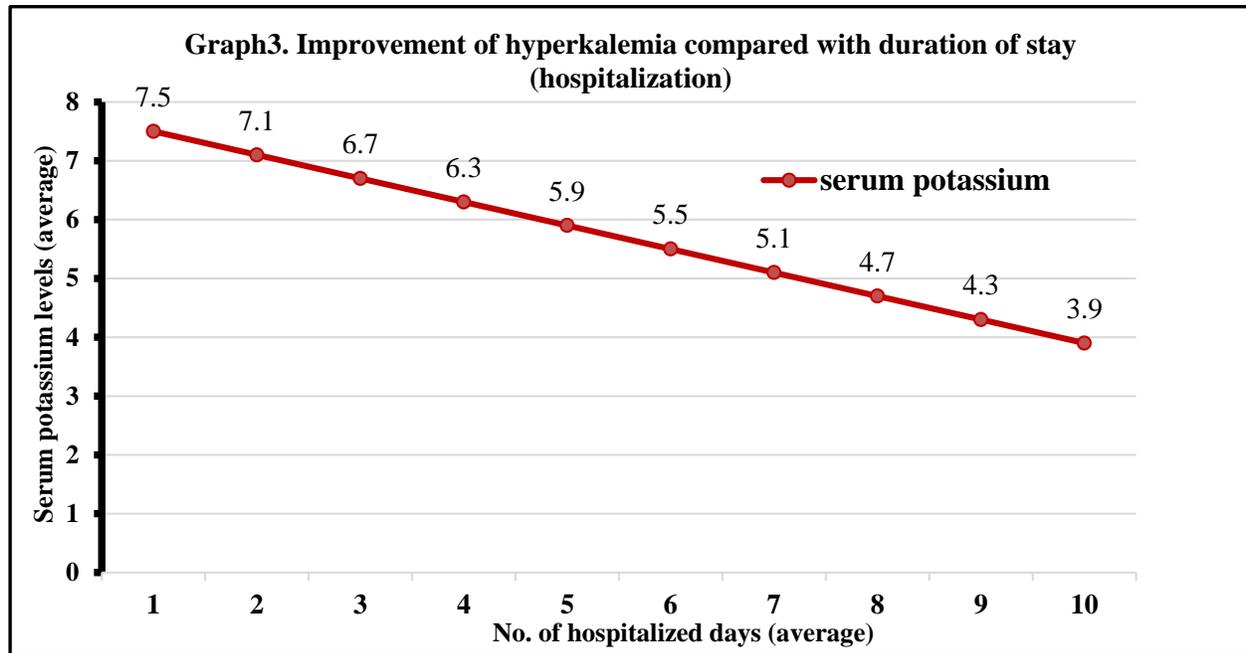


Graph 2: hyponatremia (low sodium levels) improvement after hospitalization

Graph 2 presenting the low sodium levels plotted with duration of stay Hyponatremia (low sodium levels) is a very common condition which requires immediate treatment. patients showing signs of hyponatremia in renal failure

condition leads to sudden loss of sensory, decreased heart rate sometimes leads to neurological disorders on long - term effect. The sodium levels the lowest was from 120 mmol/L and the improved level was 145 mmol/L after the treatment with diuretics (loop diuretics), 100ml of normal saline. Eventhough giving IV fluids is restricted in renal failure but for an immediate outcome fluids can be given but not for all the hospitalized days.

Graph 3. Hyperkalemia (high potassium levels) improvement with hospitalized days.



This study considered all the patients with hyperkalemia and treatment provided with diuretics (furosemide/spironolactone/torsemide) at lowest doses through IV then found that an improvement in the potassium levels as loop diuretics cause low potassium levels by sodium retention. The significance was found to be $p < 0.005$ and null hypothesis rejected. Hyperkalemia also causes worsening of renal disease along with comorbidity condition like cardiac diseases, may be bleeding conditions also.

Drugs used in renal failure: Table no.2 presenting the common and safer drugs used in treatment of renal failure.

Drugs	Dose	Route	Frequency
Piperacillin + tazobactam	2.25g	IV	BD
Ceftazidime + tazobactam	2.25g	IV	BD
Amlodipine	5mg	PO	BD
Amiodarone	100mg	PO	OD
Carvedilol	3.125mg	PO	BD
Isosorbide mononitrate	10mg	PO	BD
Clinidipine	10mg	PO	BD
Metoprolol	25mg	PO	OD
Ivabradine	5mg	PO	OD
Furosemide	10mg/10ml	PO/IV	OD
Telmisartan	10mg	PO	BD
Diltiazem + amiodarone	90 + 100mg	PO	OD
Nifedipine	20mg	PO	BD
Lupulin	50 IU	S/C	Acc to GRBS
Human actrapid	40IU	S/C	Acc to GRBS
Inj.Basalog	100 U	S/C	Acc to GRBS
Glipizide + metformin	2mg + 500mg	PO	BD

Glicazide	40mg	PO	BD
Sitagliptin	50mg	PO	OD
Sodium bicarbonate	1000mg/10ml	PO/IV	TID
Inj. Nephessential	100ml	IV	OD
Inj. Tracemox	3ml	IV	OD
Calcitriol	0.25mg	PO	OD
Taurine, acetyl cysteine	600mg	PO	OD
Ketoanalogue	100mg	PO	TID
Sevalamer carbonate	800mg	PO	BD
Urseodeoxy cholic acid	10-15mg	PO	BD
Metazolone	2.5mg	PO	OD
Co-enzyme 10	30mg	PO	OD

IV. CONCLUSION

Renal failure is leading to high morbidity, effective treatment is required for better outcomes. So from the above we conclude that patients are showing improvement on providing a better choice of treatment plan considering their eGFR and adjusting the normal doses to renal doses is essential along with daily follow up on renal function tests, serum electrolytes, hemoglobin to provide further care.

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Recent development in Graphene technology for multidisciplinary properties and its applications: A Review

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Abstract- Among distinct 2-D materials, Graphene has attained higher potential due to its attractive properties. This material provided a new dimension to nanotechnology and material research. It has a 2D honeycomb structure lattice having a single layer of carbon atoms due to which it is flexible in nature, durable and lighter than any material. It has a wide range of applications starting from the fabrication of products, biological engineering, optical electronics, electrical engineering, and biomedical field. Morden Graphene's research has been directed towards the exploration of electronic properties and their electron transfer properties. This attracts the interest of scientists and engineers to come up with new theories and technologies. Experiments are conducted on Graphene to discover new features suitable for different area of interests. Graphene is among one of the materials which are undergoing intense research due to its fascinating properties from the last 2-3 decades. In this review paper, some basic properties of Graphene are discussed, followed by their respective applications, and then-current research in Graphene is explored. Overall this paper gives an overview of Graphene in terms of properties and its applications, especially in the medical sector, which will enlighten future research in the field of material science.

Keywords- Graphene, 2D Materials, Applications of Graphene, Protective Coatings.

1. INTRODUCTION

Materials are the foundation of innovative work. Among these materials, Graphene is one of the most famous Carbon-based materials and was considered as the best monolayer production ever, which has a look for the most consideration toward exploring in material science. It is a 2D material, which is a single layer of carbon atoms removed from its parent material graphite (an allotrope of Carbon whose layers are 0.335nm separated from one another). Graphite's structure made out of thousands, and a vast number of layers are stacked on one another and held by weak van der Waals forces. It isn't stable too. If one layer from Graphite is peeled out, we get a layer called Graphene. This single hexagonal layer contains carbon atoms reinforced together by covalent bonds (every carbon atom is attached to three more carbon atoms, consequently holding its hexagonal shape), which makes this material multiple times stronger than steel and numerous times more grounded than diamond. Because of its intriguing properties, it is essential to learn about the structure and its conduct. It has a Carbon-Carbon bond separation of 0.142nm with stable configuration [1]. There are two unique types of Graphene that are taken to explore the reason. The unadulterated type of Graphene is named Pristine Graphene, and the segregated Graphene sheets liberated from any imperfections are called free-standing Graphene [1]. It has a broad scope of different properties that incorporate its weight (0.77 milligrams/m²), waterproof, consumption safe, artificially inactive, non-responsive to the environment, and specific surface area of 2630 m²/g [2]. Graphene can be set up by chemical vapor deposition (CVD), physical vapor deposition (PVD), chemical etching, mechanical exfoliation, hummers technique, and so forth. It has numerous preparation techniques as well as has multiple applications that range from wellbeing to cutting-edge gadgets and the aviation sector also.

Presently one would ponder that Graphite is milder material, and Graphene is more enthusiastically. So this is a direct result of the auxiliary property, which is discussed before (Graphite comprises stacked layers with weak van der Waals forces, and Graphene consists of carbon atoms with stable covalent bonds). Because of its solid properties, it may be utilized as protective coatings, such as compound obstruction coatings, erosion opposition, wear obstruction, heat-retaining coatings, and so forth. In this way, therefore, the Graphene is oxidized to make Graphene oxide (GO). Be that as it may, then again nearness of oxygen can exhaust the properties along these lines to guarantee the least oxygen content. The reduction is made, bringing about reduced Graphene oxide condensed as r-GO. The contrast between GO and r-GO is the measure of oxygen content [3,4].

Consequently, r-GO is favored because its properties are close to that of perfect Graphene, so today, for the most part, r-GO is set up for analysis reason; anyway, hummer technique is centered around the arrangement of r-GO. Conversely, modified hummer's method likewise centers around the mechanism of acetone-GO (a-GO) and ethanol-GO (e-GO) [3,4]. According to future forthcoming, Graphene is increasingly centered around the use of energy sustainability, production and storage modules. Some researchers and examines are building Graphene batteries, Graphene nano-electronic gadgets like chips, ICs, circuit sheets, and so forth. They have likewise discovered that saltwater can help in creating power through graphene [5]. It has also contributed towards wellbeing as GO contains COOH and OH gathering, which get join to different biomolecules [6]. Contemplates have investigated the utilization of Graphene oxide for disease treatment and mitigating drugs. Aside from that, analysts additionally acquainted fluorescent particles with GO and used the functionalized Graphene as an in vitro and in vivo imaging test [7]. A bit of commitment towards avionics division as the security and execution of an airplane could be upgraded fundamentally by presenting molecule slight Graphene in the materials which are utilized to make an airplane. Further utilization of Graphene likewise expected to decrease the heaviness of the content, contributing towards improved airplane efficiency [8].

The revelation of protection and offbeat superconductivity in turned bilayer graphene (TBG) has resuscitated enthusiasm for TBG. Above all, a few perceptions were made on these wonders, which brings about the limited scope of turn edge (1.05°). It was the principal enchantment point, where the relative level band seems nonpartisan [9-11].

Graphene has its application in the guard area too. The impenetrable vests are planned with the end goal that it gives better assurance while holding other crucial boundaries like weight, portability, adaptability, breathability, and the expense of creation [12]. The vests comprise aboard (a jacket formed body protective layer composed of cutting edge polymers, for example, Kevlar, Dyneema, and spectra strands). The web-like structure is utilized to retain the high speed of the projectile [13]. The properties and uses of Graphene have appeared in Table 1. So Graphene has given a broad zone of research fields and applications anyway. It is the most looked into theme among different materials. Generally, an ever-increasing number of properties are coming up.

Table-1: Graphene properties with its applications.

GRAPHENE		
S.NO	PROPERTIES	APPLICATIONS
1.	High electron mobility and 2D structure	High-speed transistors, spin devices, single-electron transistors, semiconductors, memories, quantum hole resistance standard elements (QHRE)
2.	Chemical sensitivity, chemical reactivity	Chemical sensors, hydrogen storage materials and batteries
3.	Optical transparency and electrical conductivity	Laser materials, transparent electrodes, non-resistive conducting wires/strips, etc.
4.	Mechanical strength, light in weight, piezoelectric property	Micro electromechanical systems (MEMS), Nano electromechanical systems (NEMS)

2. A BROAD VIEW OF EXPERIMENTS CONDUCTED ON GRAPHENE

2.1. MECHANICAL PROPERTIES

Even though Graphene is a 2D material and a single nuclear thick sheet of Carbon displays magnificent mechanical properties. Its ultimate tensile strength is 130GPa, which is a lot higher than A36 steel (0.4GPa) and armide (0.375GPa). Considering the heaviness of Graphene, which is 0.77mg/m² (contrasting with a paper, Graphene is a hundred times more slender than a solitary piece of paper). When the Graphene sheet has developed on silicon dioxide value, the outcome is as follows; the spring constant is 1-5N/m and the young modulus = 0.5TPa, thickness = 2-8nm. A Graphene film is deposited on a substrate by mechanical deposition (MD), in around well pattern, and was exposed to stack by tip nuclear power magnifying instrument. The equation derived for non-linear to tensile load comes out to be: $\sigma = E \epsilon^2$, where σ is the applied pressure, ϵ is the elastic strain, 'E' is the young modulus, and 'D' is the third-request versatile solidness [1].

Trials and PC-produced results anticipate that solitary layer Graphene can have the young's modulus up to 1.05TPa and third-order stiffness up to - 2.0TPa, which thus persevere high adaptability including the fragile crack at 110GPa (intrinsic quality) of stress applied. Conversely, the pristine Graphene endures the young's modulus of 1TPa, and weak break at 130GPa (unique quality) of stress applied. Nonetheless, the material has indicated non-straight flexible and delicate break conduct in some plane of the sample.[1]

Polycrystalline Graphene was stacked with tip atomic force microscope lens along these lines the outcome comes out to be that the Graphene tears expanded grain boundaries at a heap of approx = 100nN, Which is not precisely the worth gotten for single layer peeled Graphene (1.7mN) [1]. In this Graphene type, contrastingly arranged structure combined by grain boundaries.

2.2. STRUCTURAL BEHAVIOR

While probing the material, it gets imperative to search for the structure, and its insufficiency, which may influence the investigation led on that material and furthermore the outcomes. For various tests material show diverse conduct in its structure and grain limits, heading towards the conversations, which gives a thought of the grain boundaries of this material [1].

Cracks are the significant imperfections that practically any material show while being tried in the research facilities; however, that gives us the consequence of the examination as well. Pristine Graphene with monolayer structure shows cracks when unavoidable stress is instigated. There are two sorts of break design framed relying upon the magnitude of tensile stress, as appeared in Fig 1.

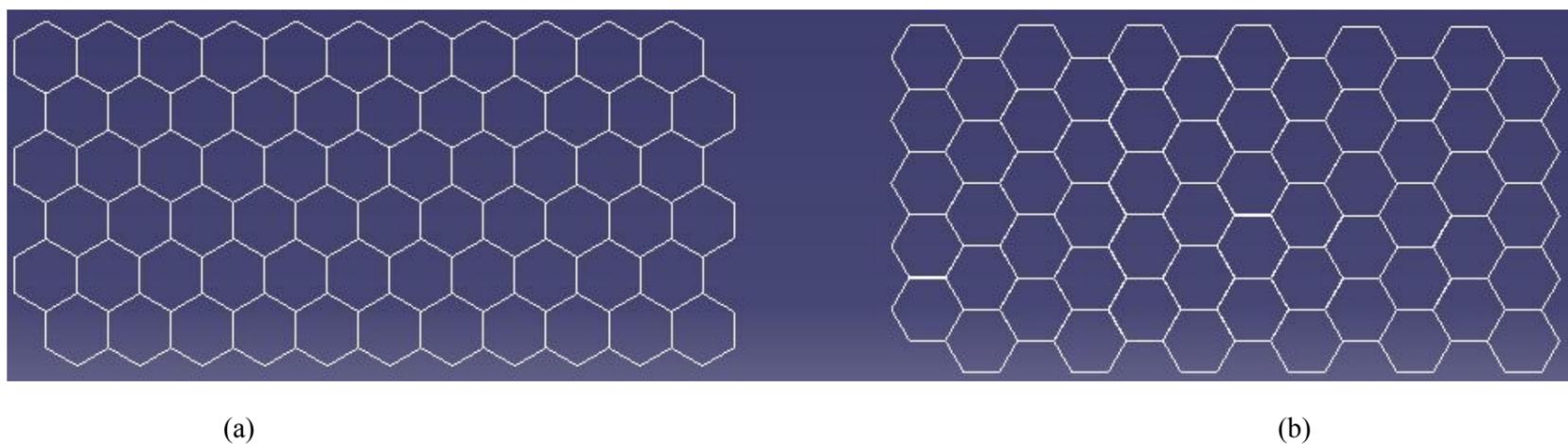


Fig. 1: Type of crack pattern: (a) zigzag (b) armchair.

Armchair and zigzag pattern rely on the bond of the structure at the nuclear level wherein low adherence prompts the first armchair at that point as loading progress prompts zigzag, though, in high adhesion, zigzag increments and the armchair pattern is in the middle of the two limits. Along these lines, zigzag decreases the thickness of the sheet after it is broken [1].

Graphene has a crystalline hexagonal grid, and the atoms are tightly packed in a hexagonal pattern, when the tensile stress surpasses plastic deformation, somewhat the taper geometry is seen which prompts the distortion of the structure and change in general mechanical properties [1]. The mechanism of Graphene under tear stacking appears in Fig 2.

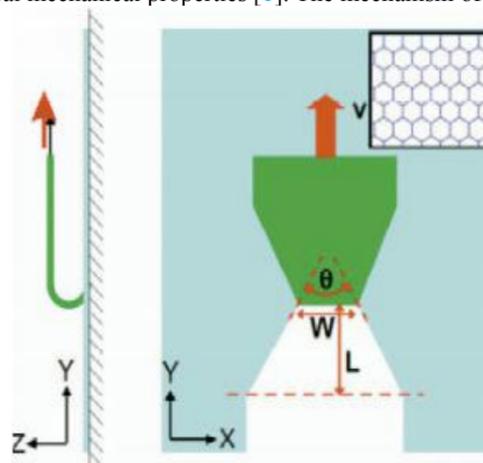


Fig. 2: diagram of the setup for the tearing studies of Graphene: side and top views. The inset shows the sheet orientation. [1]

Some common dislocations and grain boundaries defects include [1]:

1. Vacancy defect
2. Stone-wall defect
3. Dislocations
4. Line defects in grain boundaries

Defects in Grain boundaries decreases the strength of the material and dislocation leads to transitional un-symmetry i.e formation of pentagon-heptagon pair. The diagram of formation of pentagon-heptagon pair is shown in Fig 3.

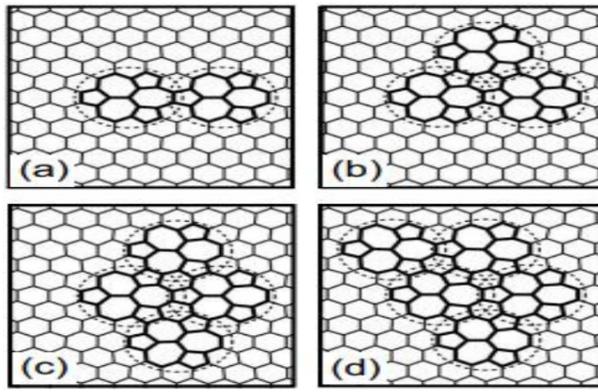


Fig. 3: Formation of pentagon-heptagon pair [15].

Further, as per the perception made through an electron beam microscope shows that the dislocation move in the Graphene sheet, making a dipole lattice. Symmetric grain boundaries(GB) alludes to the general direction of the adjoining grid is symmetric alongside GB [1]. Burger vector (BV) decides the angle of pentagon-heptagon GB if $BV = (1,0)$ - dislocation, it alludes to the armchair pattern in the event that BV is in the middle of $(1,0)$ and $(0,1)$, at that point, it identifies with $(1,1)$ i.e., zigzag pattern development. The high style followed by the burger vector is known as (m,n) - disengagement [1]. In this way, as indicated by this hypothesis, grain boundaries have serpentine-like geometry. TEM picture speaks to the tear of Graphene moved to substrate is appeared in Fig. 4

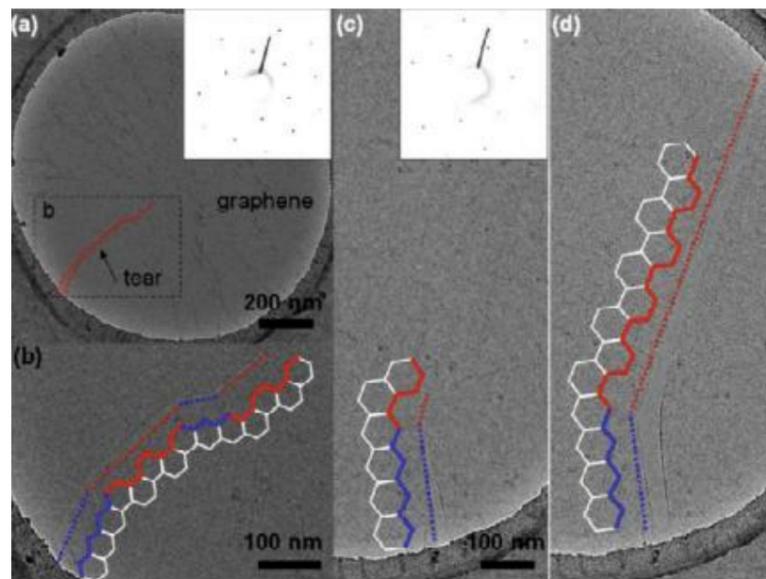


Fig. 4: TEM image represents the tear of Graphene transferred to substrate the tearing of Graphene is deflected by 30° and, the red and blue line represent armchair and zigzag pattern after tearing [1].

Polycrystalline Graphene layer developed on copper by chemical vapor deposition (CVD) and moved to silicon nitride grit followed by a nanoindentation test under a magnifying instrument [16]. Grain boundaries assimilate shapeless Carbon and iron oxide nano-particles and grain boundaries development, and out of plane rippling diminishes the quality of poly-crystalline Graphene, where elasticity is seen as 35GPa which is not exactly pristine Graphene[16]. Graphene sheet arranged was pulled in both opposite and corresponding to GB line at a time followed by the applied stress at the armchair and zigzag pattern[1]. The event of miss-direction, which expanded with applied tractable stress, further perception prompts an expansion in an ultimate failure strength and directly to disappointment. Grain boundaries separation angle found between 20° to 30° . [1]. The quality of GB (20° to 30°) with thick dislocation was higher than the quality of low GB edge with second rate thick disengagement. The crack of the bicrystal structure at normal stress. The strain of Low thickness, impressive period disengagement, and low point GBs were more noteworthy than the high thickness, little period separation, and high edge GBs.[1] Strain opposite to GB prompts fragmented crack, breaking off a hexagon-heptagon pair prompts the formation of nanovoids. Fig. 5 demonstrates the pattern of extending Graphene opposite and corresponding to GB with deformity development.

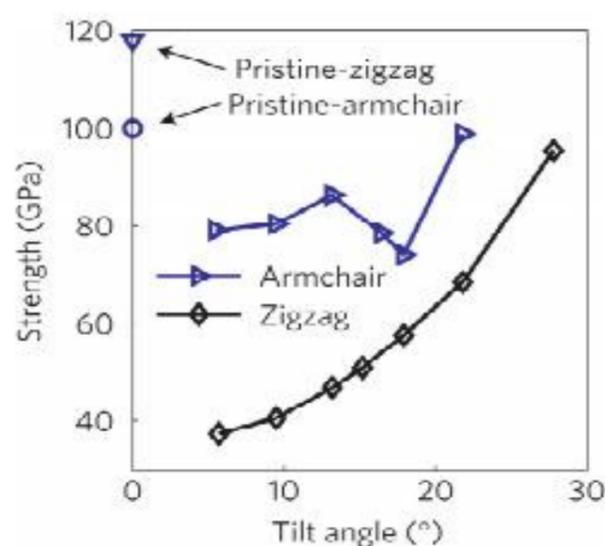


Fig. 5: graph shows the trend of stretching Graphene perpendicular and parallel to GB with defect formation. [1]

3. FOLDING OF GRAPHENE SHEETS

Different analyses were directed like the tensile loading. One of them was pressure corresponding to GB. This examination brings about a confounded structure or non-homogenous arrangement of Carbon in the Graphene sheet, which can likewise be utilized in the creation of foldable electronic gadgets. Pressure opposite to GB impacts the mechanical transport property and impacts the plan of the polycrystalline form[1]. The Elastic strain of moderate bent Graphene gives phenomenal electronic properties whose inside structure takes after an inflatable or air pocket like shape. Graphene layer altogether lessens erosion on metal, because of its boundary impact on the medium, for example, water, air, etc. Because of this property, Graphene films are known to be the most slender defensive layer (GPL); hence, a GPL has layers of thickness 1-10nm, length, and width of 0.05-10 microns. Be that as it may, different tests were directed to decide the restrictions of the material under doping conditions[1]. One of them was that the GPL is blended in with ceramics brings about high durability and break opposition including consumption obstruction property another model is as per the following: silicon nitrate blended in with one wt% GPL which expands crack strength meant by $K_{ic} = 9.92MPam^{0.5}$ while without GPL the K_{ic} was seen as $6.89MPam^{0.5}$ [1]. GPL in earthenware production shows the impacts which were higher than Carbon nanotubes or Carbon nanofibers.formation.

The following experiment will show the results of GPL [1].

Oxygenated Graphene sheet (GPL) dispersed in the polymer matrix.

Graphene (GPL) inclusion by 0.125 %wt

- increase in K_{ic} by 65%

- ultimate tensile strength increase by 45%

-Young's modulus increase by 50%

- resultant material became crack resistance

- increase in fracture toughness with the addition of silicon dioxide (SiO₂) = 14.8% wt, aluminium oxide (Al₂O₃) = 5% volume and titanium oxide (TiO₂) = 10%. the addition of these materials leads to an increase in toughness by 60%-65%.[1]

- addition of Carbon nanotubes further in the result results in an increase in toughness by 42%

4. HYDROPHOBICITY OF GRAPHENE

In science, hydrophobicity is the physical property of an atom that is apparently repulsed from a mass of water (known as a hydrophobe). (Strictly, there is no appalling power included; it is nonattendance of fascination.) conversely, hydrophiles are pulled in to the water. In this examination Graphene nano-plates and poly-propylene are combined under the temperature and pressure of 190° C and 15MPa for 15 minutes, the composite thus formed was put over hot strip test followed by the hot squeezing, a notch was made by razor blade on the sample. The sample is plunged into fluid nitrogen to make it brittle. Finally, the outcome directs to the mass fraction of GNP as 5wt% and 10wt% [17]. Material science framework OCAZO DATA id used to test the contact angle of three unique samples that were utilized to consider the normal test esteem. The contact angle of PP weak crack was seen as between 107° to 113° [17]. The round bead was seen at 20wt% GNP/PP composite with a contact angle between 159° to 165°, which is superhydrophobic. A mirror-like impact is watched submerged. Since a defensive layer of air is shaped on a superficial level submerged, which reflects light entering the water at that surface [17]. the state of a droplet on unadulterated pp surface and its contact angle appears in Fig. 6

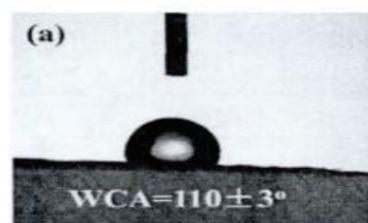


FIGURE 3. Pure PP cross-sectional surface

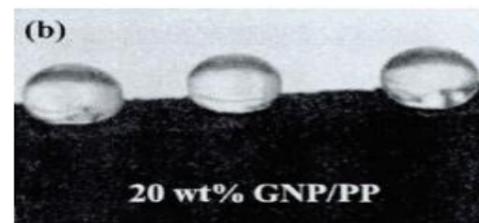


FIGURE 4. Optical cross-sectional surface

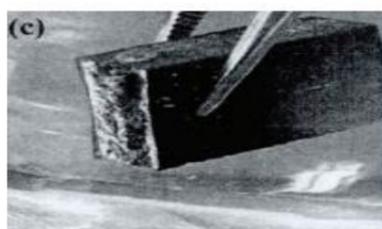


FIGURE 5. Mirror-like phenomenon



FIGURE 6. 20 wt% GNP/PP cross-sectional surface

Fig 6: (a) Represents the shape of a droplet on pure pp surface and its contact angle. (b) by adding 20 wt% of GNP/PP, the intensity of spherical shape improved. (c) a mirror-like phenomenon is seen underwater, which ensures the presence of hydrophobic property on the material. (d) the contact angle for 20 wt% GNP/PP is shown [17].

5. TRIBOLOGY OF GRAPHENE

Tribology is a study of interfacing surfaces in relative movement which thinks about the impact of erosion, wear, and lubrication of any material. Graphene, because of its high surface territory and 2D structure it is considered as the super greasing up material, and the high hardness of this material, mirror its enemy of wear property. As an experimental approach, Precisely separated Graphene is moved to an exceptionally p-doped Si substrate secured with a 300 nm thick SiO₂ layer [18]. Epitaxial Graphene, then again, is readied (on SiC) by tempering, synthetically carved n-type Si-ended 6H-SiC (0001) at 850° C under silicon transition for 2 min in ultrahigh vacuum condition [18]. The number of layers and nature of peeled and epitaxial Graphene on SiC is watched and assessed by Raman spectroscopy, as appeared in Fig. 7 [18]. A TI 950 TriboIndenter™ instrument is utilized to perform scratch tests on Graphene utilizing a diamond (90) conelike test with a one-micron meter radius of curvature. Scratches developed are 2-micron meter long in 60 s of the period.

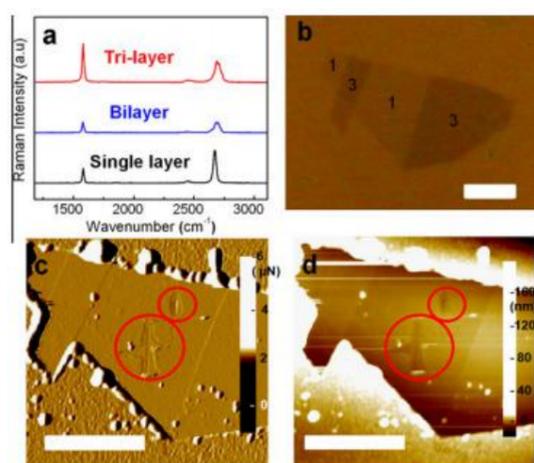


Fig 7: Raman spectra of single, bi-, tri-layer Graphene. (b) image of mechanically exfoliated Graphene on SiO₂. (c) and (d) are the conducted test effects marked in red of the scratch test effects.[18]

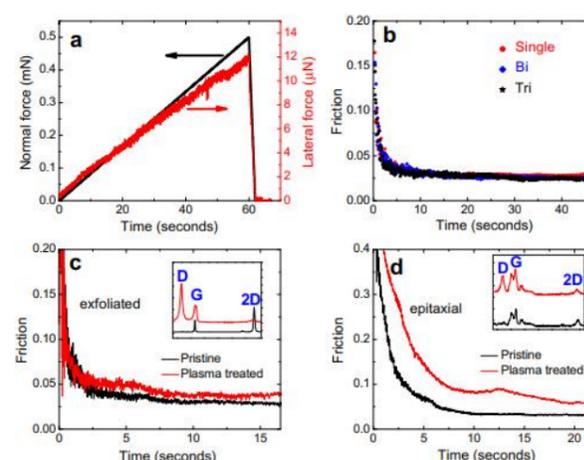


Fig 8: (a) graph between forces versus time. (b) friction coefficient versus time. (c) Friction coefficient versus images where test are time of mechanically exfoliated Graphene without and with defects. (d) friction coefficient of epitaxial Graphene without and with defects.[18]

Fig. 8(a) represents a plot between normal force and lateral force versus time (sec) of scratch test on single-layer Graphene. For plotting purpose, time scales initialled from T = 0 corresponds to the beginning of the scratch. After performing similar experiments on bi-layer and tri-layer Graphene, the friction coefficients are calculated in Fig. 8(b). The results depicts that all the Graphene samples with different number of layers yield similar friction values (0.03). First of all, the experiment is conducted at ambient and under ultra high vacuum conditions. It is due to the fact that the existence of water can influence the friction coefficient, therefore it is reasonable to have a different friction coefficient values depending on the measurement conditions [18]. The different value corresponds to difference in the size of probes; Filleter et al used an atomic force microscopy (AFM) based system, whereas this experiment uses a larger diamond probe with one micron meter radius. Table 2 shows the use of Graphene as a lubricant coating on cylinder liner of an engine to reduce wear by different claimers. However, prepration methods of different form of Graphene is shown in table 3.

Table-2: Graphene used as a lubricant coating on cylinder liner of an engine to reduce wear by different claimers:

S.NO	YEAR	AUTHOR	MATERIAL	SUBSTRATE	PROCESS	REAMRK
1.		Hao Liang et al. [19]	3D HPGS	grease	Direct addition	1. Reduced wear volume by 52% 2. Reduced friction coefficient by 20.3%
2.	2020	Mohamed Zakaulla, Fathima praveen et al. [20]	Graphene/boron carbide particles	PolyCarbonate composite	Injection moulding/quenching	1. Wear = 0.35um 2. coefficient of friction = 0.13
3.		Selman Demirtas. [21]	Graphene	Cast iron piston ring	CVD	Reduced friction and wear, more wear at TDC due to high pressure contact
4.	2019	Yufu Xu et al.[22]	MoS ₂ and Graphene	Cylinder liner/piston ring	Laser induced coatings	Improved tribology
5.		Santosh Singh et al. [23]	Hydrophobic r-GO-Ni	Ni-matrix	Pulse Electrodeposition	CA = 111.8°, Improved tribology
6.	2018	Mohamed kamal ahmad ali, Hou Xianjun,et al. [24]	Graphene lubricants	nano Engine (cylinder liner)	Direct addition	1. Improved anti friction property by 29-35% 2. Anti-wear property by 22-29%
7	2017	Khagendra tripathi, et al. [25]	Graphene film	Grey cast iron cylinder liner	CVD	Reduced friction by 53%

Table-3: Preparation methods of different forms of Graphene over several years

S. NO	YEAR	AUTHOR	PREPERATION METHOD	SUBSTRATE	APPLICATION	REMARK
1.	2013	I.A. Ovid'ko [1]	Mechanical deposition	Quantifoil holey Carbon	Structural	E= 1.0TPa D= -2.0TPa Strength = 130GPa
2.	2011	S. Ruiz-Vargas et al [16]	CVD	Copper, transferred to silicon nitride grit	Structural	Tensile strength = 35GPa
3.	2017	Yun Bai [17]	Joining together under temperature and pressure	GNP/PP on hot strip sample	Hydrophobic coatings	Contact angle = 107-113°
4	2010	M.A. Rafiee, etal [26]	dispersion	Polymer matrix	Hardness coatings, fracture resistance coatings	K _{ic} = 65%(inc) Ultimate tensile strength = 45%(inc) Crack resistance material
5.	2011	Young Jun Shin, et al [18]	Epitaxial and mechanical exfoliation	SiC	Scratch (wear) resistance coatings	Coefficient of friction = 0.03
6	2008	Haiqun Chan, et al [27]	Thermal annealing, soaking, rinsing, sterilization, air drying, etc	96-well polystyrene cell plate	Artificial organs, struts, capsules, etc	Green fluorescent metabolically active cells growth
7	2010	Luis A. jauregui, et al [28]	CVD suspended Graphene	Au/Cr/SiO ₂ trench	Thermal resistive linings, coatings	Thermal conductivity (k) = 5000 W/m-k

8	2009	Chang-Duk kim, et al. [29]	synthesis	Aluminium sulfide	Foldable electronics, touch screens, display watches	Alpha Al ₂ O ₃ and Graphene sheet
9	2014	Xiehong Cao, et al. [30]	Direct deposition and CVD	Au and stainless steel	Conductors, sensing application, bio sensors, anti bodies	Vertically grown 3d graphene structure
10	2014	Lesiak, L. Stobinski, et al. [31]	Oxidation and photoelectronic spectroscopy of Graphene power platelets of 8nm thick	-	Water purification, structural material, alloys	Reduced Graphene oxide with eliminated contaminate
11	2015	Ali Reza Kamali and Derek J. Fray [32]	Hydrogen diffusion on graphite	Graphite rods	Electrodes	High quality Graphene nano sheets
12	2016	Xin Chen, et al. [33]	Modification of dielectric surface, plasma enhanced CVD, introduction to metal gas phase	Di electric, substrate	Conducting wires, for other chemical combinations	Di-electric Graphene
13	2015	Ning Cao and Yuan Zhang. [34]	Synthesis of various chemicals and corresponding reactions	Chemical reaction	R-GO	Reduced Graphene oxide

6. OPTICAL AND ELECTRICAL PROPERTIES

Optics is a field of science which portrays the laws and speculations behind the wonders occurring under permeability and infinitesimal level, the manner in which we see the world, some optical-electronic gadgets, power age, and the innovation utilizing optical applications to satisfy the needs. Graphene has discovered its situation in the field of optics and remained in front of different materials. A few properties and tested outcomes demonstrate that the Graphene can really be the best out of rest in the optical field.[35]. Graphene can absorb white light 2.3% when it is in single layer however the assimilation rate increments exponentially with the expansion in the number of layers and rest 97.7% of light is gone through the surface with around 0.1% light is reflected from the surface (for single layer Graphene)[35]. The acknowledgment between optical straightforwardness, sheet obstruction, and the number of layers can be dictated by a decline in both the optical straightforwardness and the sheet opposition relatively, with an expanding number of layers of Graphene. A solitary layer of Graphene can show an optical straightforwardness of 97.7%, and a 3-layered Graphene stack displays around 90.8% optical transparency[35]. Further, the expansion of each layer relates to a 2.3% lessening in optical straightforwardness. A solitary Graphene sheet can deliver an obstruction of 2.1 kwsq-1 (350 Ωsq-1), anyway holding 90% optical straightforwardness. The extinguishing impact of multi-layers Graphene can be up to 11%, which is more noteworthy than monolayer Graphene; it is because of a higher opening tolerating density[35].

Vitality age is the primary focal point of the present running ventures. Graphene can create power on its surface as light is occurrence on a superficial level, which makes it a decent part for sun oriented applications. [36]Carbon in Graphene contain 6 electron i.e., 2e-on its inward shell and 4e-on its external shell among those 4e-, 3e-are fortified with other 3 Carbon atoms whereas 1e-(pie electron) is free and exceptionally portable which goes on a superficial level on either side of a conductive sheet of Graphene. The two electrons and gaps are charge transporters, which goes about as a massless charge offers very nearly zero obstruction, which makes this material a decent part for making electrical links and wires for power transmission purpose.[36]. Discussing its electron mobility on a surface, it estimates 15000 cm²/v/s and with SiC as a substrate electron versatility becomes 40000 cm²/v/s, at room temperature electron versatility, is 200000 cm²/v/s where the electron and photon show comparable conduct because of the realities that they are mass less[36]. Further, it demonstrates a great reaction to the perpendicularly applied electric field, which makes it a decent part for field-effect transistors (FETs) applications, it can supplant silicon semiconductor (nanoribbons). It very well may be utilized as a channel in FETs. It is asserted that the littlest transistor so far is made with Graphene with one nuclear thick and ten particles wide. Graphene as sheets, CNTs can be utilized as the anode because of its less obstruction offer to free streaming electron it increments charging rate whenever utilized as battery-powered batteries, chargers, and so forth [36].

6.1. Effect of doping in Graphene solar cell:

The doping of heteroatoms into a sheet of Graphene can radically change the synthetic, physical, mechanical, electronic and photonic properties of the Graphene sheet. this is a typical methodology in the creation of numerous solar cells. by and large There are two fundamental kinds of doping I.e p-type and n-type [35]. The P-type doping uses trivalent atoms, for example, boron, which removes an electron from the Graphene sheet in this way making a gap, thus a procedure known as gap doping, where the opening is made in the valence band of the sheet. While, then again n-type doping includes pentavalent molecules, for example, phosphorous, and it is an electron giving doping approach that encourages a free electron from the pentavalent particle onto the Graphene sheet[35]. The free electron in such manner is encouraged in the conductance band of the sheet. Doping a Graphene sheet should be possible through different strategies, which incorporates through strong, fluid and vaporous stage synthetic doping, ball processing, warm tempering, in-situ doping during CVD techniques and plasma treatment. The impact of doping adjustment relies upon the sort of Graphene subsidiary utilized and the doping procedure utilized [35]. Contingent upon which of these boundaries/process (or both) are utilized in doping process, the final product anyway is improved effectiveness of the sun powered cell. Fig. 9 shows doped sunlight based cell [35].

Graphene is an exceptionally investigated zone whose consolidation is in the polymer-based solar cells. Anyway, Polymeric materials offer numerous points of interest over inorganic-based materials because of their simple changing property, modest and straightforward manufacture forms. Graphene has demonstrated an extraordinary favorable position in transparent anodes over indium tin oxide (ITO) in polymer-based sun-powered cells[35]



Fig. 9: doped solar cell [35].

The Graphene covered cathode is a natural inorganic half and half material in the wake of experiencing through decrease and temperature toughening forms. This kind of crossover material has superior vivacious abilities, as the fermi-level of Graphene and the semi-directing layer are nearer to one another for an effective charge inclusion[35]. Graphene-based polymer cathodes are transparent and furthermore have a high work followed by high conductivity. However, it has a restriction of 65% light transmittance. To diminish the Graphene into half and half structures, CVD created Graphene can be utilized as a transparent anode. CVD created Graphene is treated with ozone, which produces Carbonyl and hydroxyl utilitarian gatherings on the outside of Graphene[35]. Anyway, the oxygen-based utilitarian gatherings in Graphene improves the open-circuit voltage (OCV), however, decreased conductivity is an exchange off because of the way that sp² hybridized covalent system is upset by sp³ bonds around the functionalized Carbons.

Non-covalent functionalized CVD Graphene shows a decent conductivity and can have up to 0.55 V OCV, fill factor of 55%, and a PCE of 1.71%[35]. Graphene is an adaptable material, permits the sun-powered cell to twist up to 78° more than unadulterated ITO terminals. The electron transporter and acceptor based Graphene-polymer sunlight based cells rely up upon a high electron proclivity to isolate the sets of electron and gaps into discrete charges. In contrast to different materials, Graphene isolates accuse when blended with conjugated polymers. Graphene has an enormous surface region which permits a ceaseless pathway and different giver/acceptor locales for an effective electron move to occur. This kind of sun oriented cells creates a PCE of 1.1%. By and large, an opening vehicle layer is required in numerous sunlight based cells. This is on the grounds that to stop current spilling and charge recombination[35]. Hence Graphene can be blended in with polymeric material to offer ascent to a material with a band hole of up to 3.6 V, which in this manner disallows electron relocation from the cathode to the anode. A 2nm Graphene film is referred to give the best outcomes as the thick film forestalls the transmittance of electrons and increments electrical obstruction. The most noteworthy PCE acquired has been 9 %, which is similar, if not more prominent, than different materials utilized as gap transport layers[35]. In the wake of experiencing a profound conversation on its properties and conduct now, we come to know how astounding this material is for future innovation significantly it is being seen that the material demonstrates the vast majority of the positive effect on the innovation and affirmed through a different test and less of negative effect or no so ever.

So after this examination this material makes us sure to be utilized in different applications these days. In spite of the fact that not just its properties are sufficient to make the fantasies work out as expected there are sure planning strategies which one have to experience while reading for this material with the goal that one can build up this material for additional testing[35]. So now we are going to look some arrangement strategies which researcher has followed to set up this material around the globe. So after the discussion on the properties of Graphene, conclusion comes out to be as summed below;

- high mechanical strength = composite materials, bullet proof jackets
- high thermal conductivity = heat sinks, solar cells, solar paints, etc.
- high surface area/zero resistible = batteries, super-capacitors, fuel cells
- inert = non corrosive property
- high transparency = LCD's, electronic chips, etc.

7. HUMMERS METHOD

This strategy plans to get ready Graphene oxide (GO) instead of flawless Graphene since remembering the way that immaculate Graphene can't be utilized directly as an application reason.

Graphene oxide (GO) was created utilizing altered hummers technique from pure graphite powder since Graphene is an allotrope of Carbon. In this technique, 27ml of sulfuric acid (H₂SO₄) and 3ml of phosphoric acid (H₃PO₄) in the proportion of 9:1 by volume were taken for expansion and blended for a few minutes[3]. At that point, 0.225g of graphite powder was included in arrangement during mixing condition proceeds. After every one of these means, 1.32g of potassium permanganate (KMnO₄) was then included gradually in the solution[3]. This blend was again mixed for roughly 6 hours, relying on the outcome emerges, i.e., when the arrangement goes to dull green[4]. To take out excess of KMnO₄, 0.675ml of hydrogen peroxide (H₂O₂) was included drop by drop and mixed again for 10 minutes. The exothermic response will happen and let it chill off for quite a while. 10ml of hydrochloric acid (HCL) and 30ml of deionized water (DIW) or type-1 water is included and centrifuged utilizing Rotator 5430R at around 5000 rpm for 7 minutes[3,4]. At that point, the supernatant was evacuated away, and the residuals were then rewashed again with HCL and DIW for multiple times. The washed GO arrangement was dried utilizing stove at 90° C for 24 hours to create the powder of GO.

Improvement in hummers strategy was made in light of the fact that in his past technique, the oxidation utilizing NaNO₃ would transmit poisonous gasses. Accordingly, in the changed hummers technique supplanting was done from NaNO₃ with H₂SO₄, H₃PO₄, and twofold the mount of KMnO₄ [3]. Different favorable circumstances incorporate progressively hydrophilic Carbon material, comparable conductivity, and no harmful gasses radiated lastly pull in enormous creation of GO.

To deliver (CH₃)₂CO Graphene oxide (A-GO) and ethanol Graphene oxide (E-GO) samples, 1 mg of GO were broken down in 1 ml of (CH₃)₂CO/ethanol arrangement (volume proportion 1:1) under ultrasonic for 1 hour.[3] 100 µl of A-GO/E-GO arrangement was then dropped on a silicon wafer and turn at 2000 rpm for 20 seconds. The covered example was then warmed on the hot-plate with 80 °C for 10 minutes[3]. This progression was rehashed multiple times. The same covering process was done on the interdigitated cathode (IDE) test, which was, for the most part, for electrical properties study [3]. The X-beam diffraction and SEM example of Graphite, GO, and r-GO appears in Fig. 10

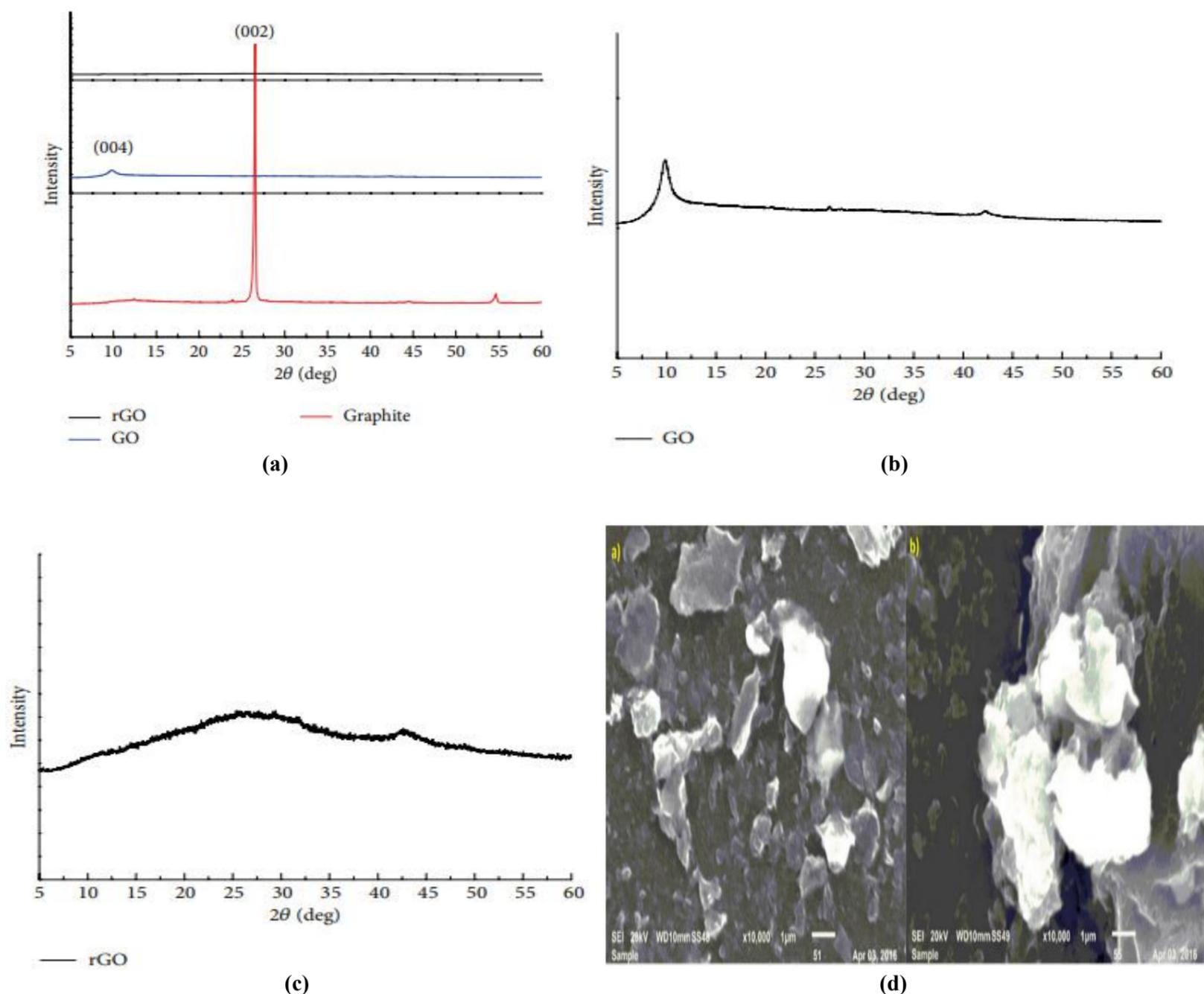


Fig. 10: (a) X-Ray diffraction pattern of graphite, GO and r-GO (b) enlarged view of GO (c) enlarged view of r-GO[34] (d) SEM image of the sample A-GO and E-GO [4]

Another methodology was made to develop epitaxial Graphene on a silicon carbide substrate to accomplish top-notch single precious stone Graphene[37]. In this strategy, SiC is warmed to high temperatures in an inert environment (argon, CO₂, nitrogen, helium), including thermal dislocation of SiC particle from the substrate to get Graphene[37]. Further, by picking an appropriate surface of Si, for example, 4H-SiC(0001) surface, one can guarantee that Graphene develops epitaxially on the substrate when Graphene is moved to a Si substrate on which oxide film was available, the optical properties of the subsequent material are seen by optical microscopy to portray the number of layers[37]. Among all these activities, different examinations are accomplished for Graphene on SiC substrate through low-vitality electron magnifying lens (LEEM), point settled photoelectron spectroscopy (ARPEP), transmission electron microscopy (TEM), etc. [37].

One of the other strategies shows that the Graphene is developed on the copper oxide film with copper and a substrate by CVD, at that point the copper foil is presented to CH₄/H₂ climate at 1000°C prompting the nucleation of Graphene island which later on becomes Graphene chips with various cross-section direction figure beneath portrays the equivalent[38]. The development of Graphene on copper has appeared in Fig. 11 and diverse structures set up at different temperature development on copper has appeared in Fig. 12

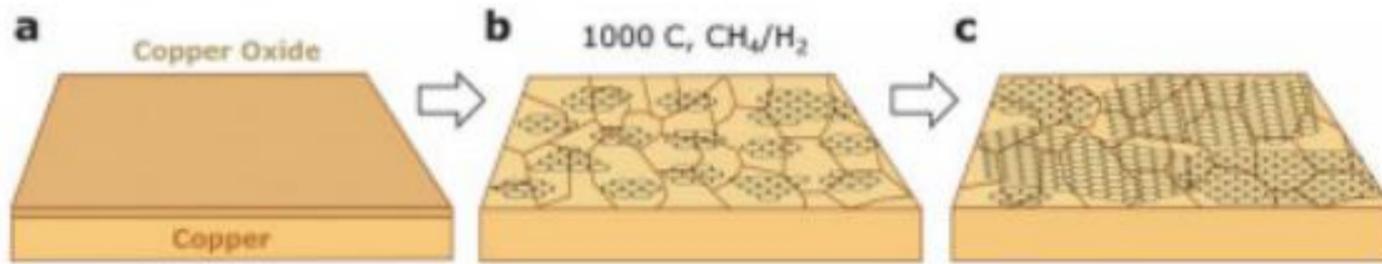


Fig. 11: Graphene grown on copper.[38].

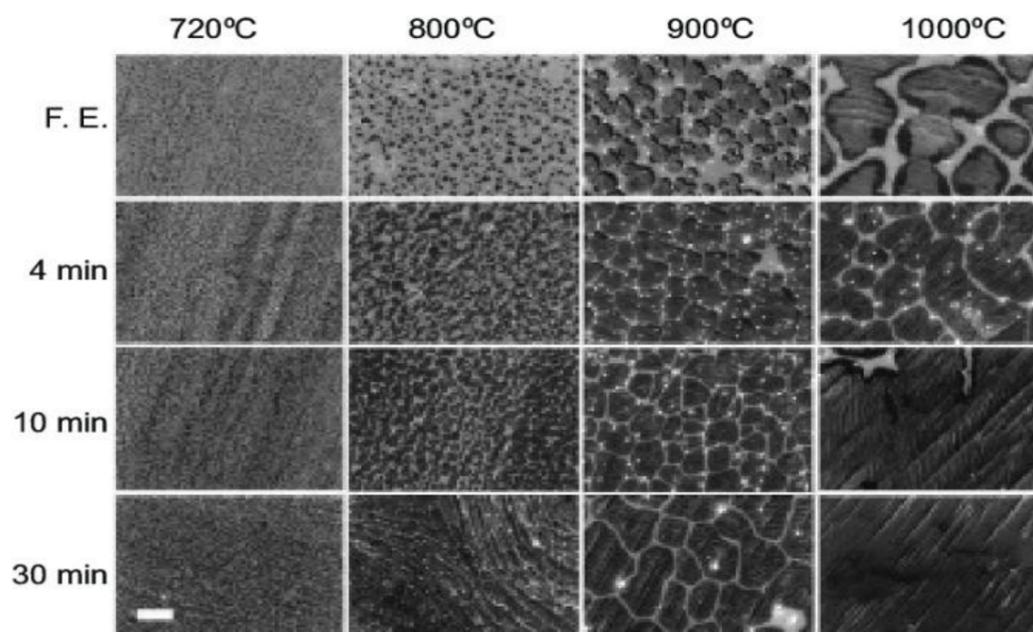


Fig 12:Representation of different structure configurations at different temperature growth on copper [39]

After being working on Graphene by many scientist lots of other properties were discovered in a trend which continuously emerging day by day there are many companies and industries currently which are global manufacturer of Graphene, some are listed below; (Table 4)

Table-4: some companies working on Graphene [40].

S.NO	COMPANY NAME	COUNTRY	GRAPHENE PRODUCTS
1.	Ceal tech	norway	Single layer sheets, coating, composites
2.	haydale	korea	Links, sensors, energy storage, composites
3.	versarien	United kingdom	composites
4.	Graphenea	spain	Single layer sheets
5.	nanoxplore	canada	Electronics, composites, thermal sinks

There are furthermore investigates going on in this specific material with the plan to locate some more properties by consolidating with various equipment,

- As of now another element is being set up in which terahertz of recurrence waves can be changed over into power with the consideration of Graphene, by curving two layers of Graphene stacked more than each other inverse at the finishes by 1.1 degrees we get material with various properties in one element i.e, in some bit of the Graphene we can watch semi-conductor, cover, conductor, etc. [41]. The point by which it is contorted is classified "enchantment edge."
- It is claimed that if salt concentrated water is permitted to stream outside of the Graphene sheet, electricity is produced on the surface. It is because of the marvels that the saltwater contains particles of positive and adversely charged. Hence, as it streams on a superficial level particles from one finish of bead is assimilated on the Graphene and through the opposite end particles are desorbed to the saltwater this sets a progression of particles, and in this manner creation of power and the connection between the speed of stream and power age is found linear[42].
- Graphene is a photoelectric material, as it is evident from the optical and electrical properties of the article referenced above. It can absorb large sum (parcels more than some other material) of warmth. Comparing Graphene and copper-based on conductivity, so it is confirmed that Graphene is better than copper since the flow thickness of Graphene is multiple times more prominent than copper with the portability of numerous times more famous than silicon, another kind of Graphene paints are the idea wherein applying Graphene paint on any material can make it electrical creation surface[43].
- Last but not the least, significant property of Graphene under tribology field is discovered that Graphene is a super-greasing up material and with the expansion of the number of layers it's frictional property diminishes and the most well-known test performed to examine this property is through nuclear power magnifying lens (AFM) in which a smaller scale indenter made of Si₃N₄ is made to slide on the outside of Graphene to watch the coefficient of erosion esteem. Graphene is then again is seen as an opposite piezoelectric material which on giving an electric charge on one of the two closures twists oppositely to the applied electric field. [44]

Some exceptionally requested mixes of Graphene oxide (GO), e.g., the supposed braced and unfastened GO, appear to have piezoelectric reactions through first-standards thickness utilitarian estimations appeared in Fig. 13 and 14. By applying an electric field opposite to the GO basal plane, the roughest estimation of in-plane strain and piezoelectric strain coefficient, d₃₁, are seen as 0.12% and 0.24 pm/V [44], separately, which are practically identical with those of some progressed piezoelectric materials.

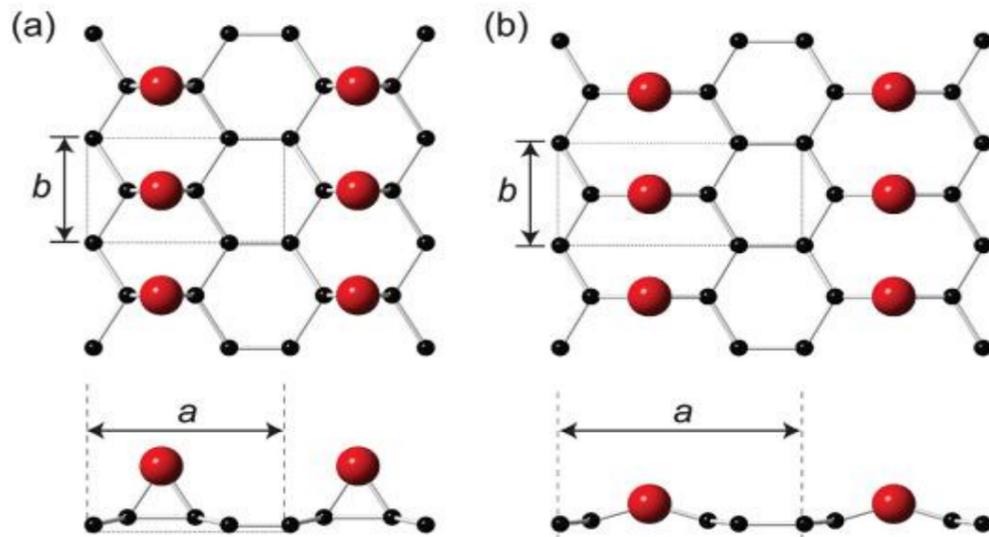


Fig. 13: (a) symmetrically clamped. (b) and unzipped, GO configuration with C/O ratio, $R_{C/O}$ of 4:1. [44]

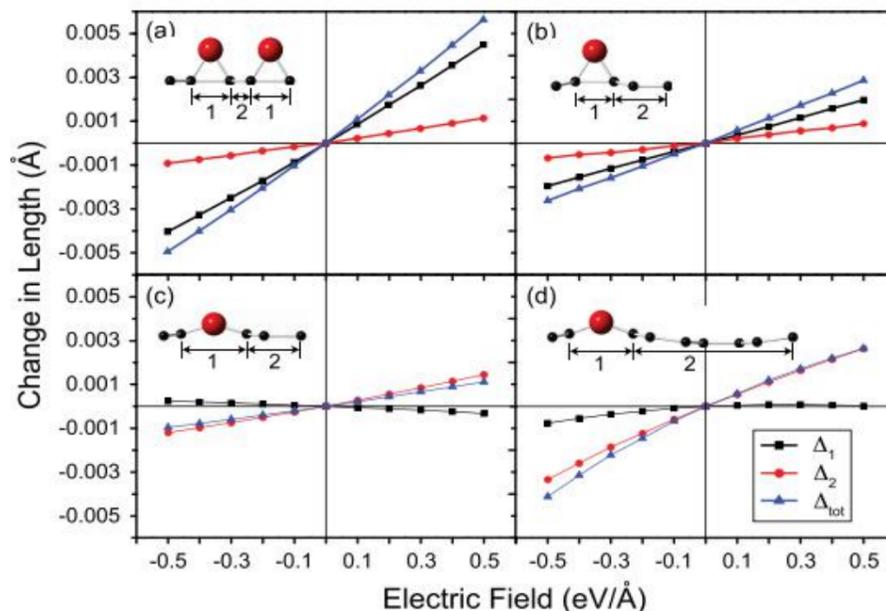


Fig. 14: strain analysis (a) C_2O -sym-clamped. (b) C_4O -sym-clamped. (c) C_4O -sym-unzipped. (d) C_8O -sym-unzipped. Changes in length with applied electric field [44].

A top to bottom atomic auxiliary examination uncovers that distortion of the oxygen doping areas in the clasped GO commands its general strain yield, though misshapen of the districts without oxygen dopant in the unfastened GO decides its general piezoelectric strain [44]. This comprehension clarifies the watched reliance of d_{31} on oxygen doping rate, i.e., higher oxygen focus offering ascend to a bigger d_{31} in the clasped GO though prompting a diminished d_{31} in the unfastened GO. As the most slender two-dimensional piezoelectric materials, GO has an extraordinary potential for a wide scope of MEMS/NEMS actuators and sensors [44]. Therefore there are numerous different properties which are covered up in. This material and investigates re disagreeably investigating this material subsequently there is parcels more examination to go.

8. BIOMEDICAL SENSING APPLICATIONS IN GRAPHENE

Organic sensors are gadgets with the installed electronic device (transducer) and natural segments like tissue, nerves, muscles, catalysts, nucleic acids, and so on. These gadgets are helping people to live more, and to remain sound, Graphene materials in these fields are turning out to be and supporting components to the extent proficiency, execution, activation speed is a concern. The biosensor typically used to identify the focused on biomolecules in the given an example empowered with remarkable electrical and optical properties. Graphene has been built as a transducing material, and it's the best-performed detecting approach that is practical gatherings on Graphene are exceptionally productive for catching atoms to break down their collaborations with the particular objective anyway. Graphene oxide (GO) is known to create oxygen-containing gatherings (hydroxyl, Carbonyl, carboxyl, and epoxide) and the event of surface charges, make it simple for the particular associations. These utilitarian gatherings a performing an essential job in biomolecular immobilization. Among these, carboxyl and epoxide are generally utilized for biosensing examination [6]. Graphene containing carboxyl gathering appears in Fig. 15

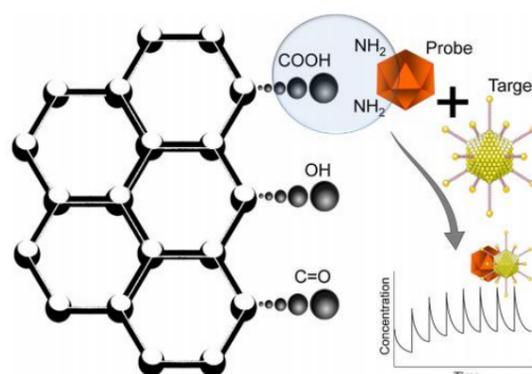


Fig. 15: Graphene containing carboxyl group and it can readily reacts with the amine moieties on the molecules such as protein. Once completing the reaction, the surface can be used for the target validation in biosensing output. [49]

8.1. Cancer therapy

Graphene being a biocompatible material along these lines, r-GO sheets with reasonable water-soluble property were set up through functionalization of the decreased sheets by gluconate particles, which is prepared during the decrease of glucose within sight of Fe impetus, with no polyethylene glycol (PEG). Just because of the glucose reduced Graphene oxide (GRGO), iron was used as a biocompatible Graphene-based nanomaterial suspension for exceptionally proficient infrared radiation (NIR) photothermal treatment of LNCaP prostate malignant growth cells in vitro. It was discovered that the GRGO-Fe with a high centralization of 1 (0.05 mg mL requires just 0.5 (12) min for complete demolition of the disease cells in the nearness of light of 808 nm laser source (power thickness of 7.5 W cm²). [7,50] Although the photothermal treatment is utilizing the hydrazine-diminished GO (HRGO), sodium dodecylbenzenesulfonate-solubilized single-divider Carbon nanotubes (SWCNT) and multi-divider Carbon nanotubes (MWCNT) suspensions could show comparable efficiencies, these suspensions demonstrated some cytotoxic impacts. These outcomes showed that the GRGO-Fe could be proposed as one of the promising biocompatible nanomaterials for application in viable NIR photothermal nano-therapy of malignant growth cells. [7,50]

8.2. Graphene coated metals for biomedical applications

Metals are utilized in full biomedical applications as a simple structure or as composites because of their high sturdiness, quality, and strength, as discussed before. The Graphene materials family can significantly improve the properties of metals and display a bio-active character to the metal-based composites. An astounding report demonstrated that composites made of substituted nanolayers of metal and Graphene had accomplished ultra-high qualities of 1.5GPa in copper/Graphene and 4.0 GPa in Nickle/Graphene tried under the nanopillar pressure test. The enhancements watched were identified with the capacity of Graphene to square separation engendering over the Graphene-metal interface. Copper-Graphene nanocomposite foils acquired utilizing electrodeposition brings about altogether higher hardness and modulus of flexibility as looked at unadulterated copper. Entirely, the expansion of 0.18 wt% Graphene nanoplatelets to 1% Mg and Al through semi powder metallurgy strategies expanded a definitive rigidity (from 236 to 268 MPa) and yield quality (161 to 208 MPa).[46]

9. TATA STEEL LIMITED GRAPHENE PROJECT

TATA Steel is an Indian Multinational Steel industry (MSI) whose headquarter is in Mumbai, India. It is one of the top steel delivering organizations comprehensively with a yearly rough steel limit of 23.88 million tons (in FY17) [47], and the second biggest steel organization in India with an annual limit of 11 million tons. Its biggest plant is in Jamshedpur city, Jharkhand territory of India, and it was the seventh most crucial Indian brand in 2013, according to Brand Finance. The R&D Division of Tata Steel Limited was set up in 1937 and is one of the most established R&D Centers in India.[47]. This Center has assumed a crucial job in the improvement of steel items and procedure courses that have given the Company an upper hand in both nearby and worldwide markets. The level of advancement of the inside can be estimated as far as the quantity of licenses (900 filled and 300 conceded).

As of late, the R&D division of Tata Steel Limited (TSL) has imagined a procedure to create Graphene from a normally happening pitch, Shellac. Shellac is a natural pitch discharged from a creepy-crawly Laccifer lacca. These creepy crawlies are reproduced on the leaves of chosen trees, for example, ber and Kusum. Attributable to the climatic and living space conditions required, Shellac cultivating is limited to scarcely any territories on the planet. By chance, India is the leading maker of Shellac on the earth [47]. Goodbye Steels' innovation utilizes Shellac as a Carbon hotspot for the union of Graphene. The Patent number WO2015/040630A1 distributed on 26/03/2015 subtleties Tata Steels' development of making Graphene beginning from Shellac as the Raw Material. Table 5 shows the crude materials required for the Tata steel industry to deliver Graphene powder, fluid, and fume.[45]

Table 5: Raw materials required for producing Graphene powder, liquid and vapour by Tata steel industry [47].

PRODUCT	MODE OF TRANSPORT OF FINISHED MATERIAL	RAW MATERIAL	ANNUAL REQUIREMENT	SOURCE	MODE OF TRANSPORT OF RAW MATERIAL	MARKETING AREA
Graphene Powder		Shellac	200 ton	Indigenous	Road	1- Composites 2- Biomedicals
		Intercalated Graphite	10 ton		Road	
		Coal Tar	20 ton		Road	
Graphene Liquid	Road	Formaldehyde	300 kL		Road	Corrosion in hibiting paint for steel 1. Rebars 2. Sheet 3. Tubes 4. Others
		Cyclohexylamine	240 kL		Road	
		Epichlorohydrin (Epoxy)	1200 kL		Road	
		IPA	6600 kL		Road	
		BYX 3441	600 kL		Road	
		Graphene Powder	600kg		None	
Graphene Vapour		Graphene Powder	10 ton		None	Flexible Electronics

9.1 The flow process for Graphene powder, liquid and vapour is shown in Fig. 16-18

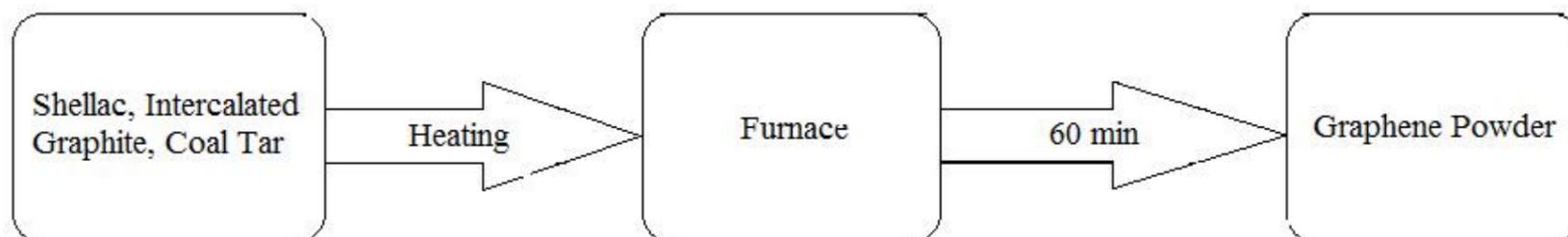


Fig. 16: Flow process of Graphene powder

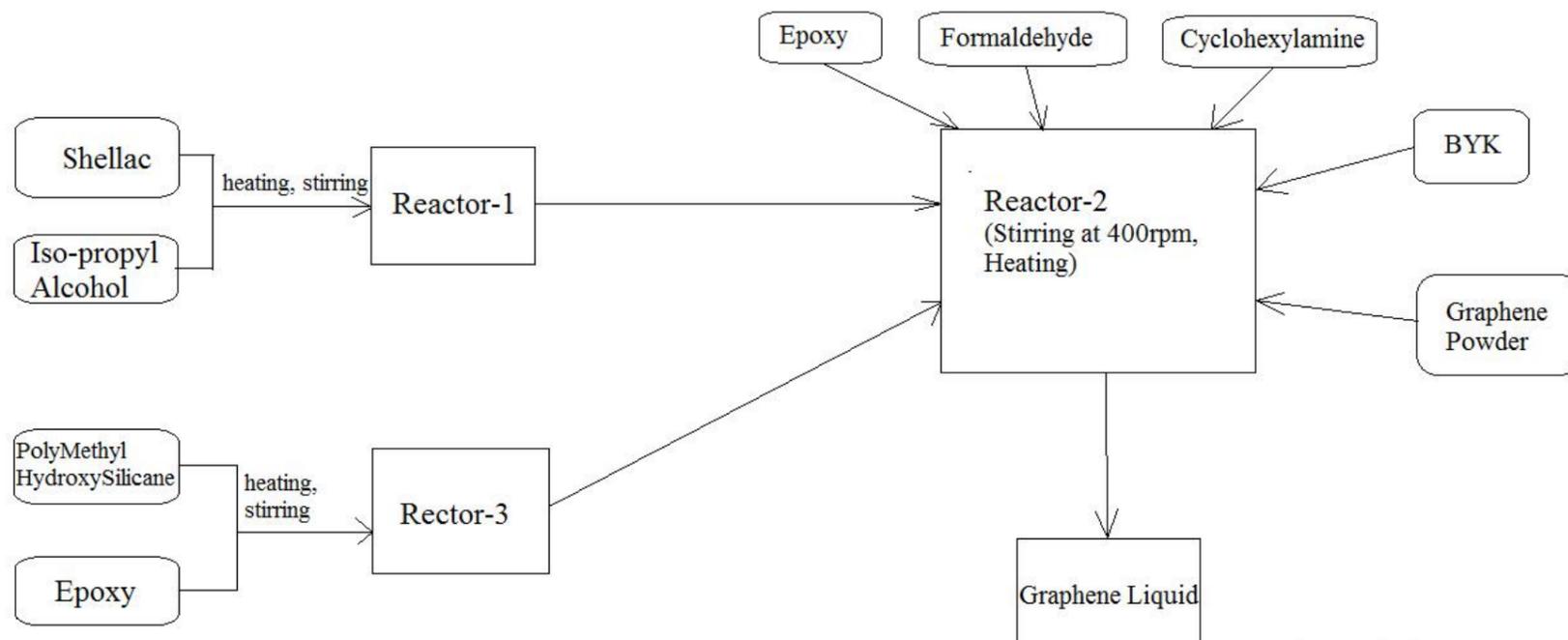


Fig. 17: Flow process of Graphene liquid

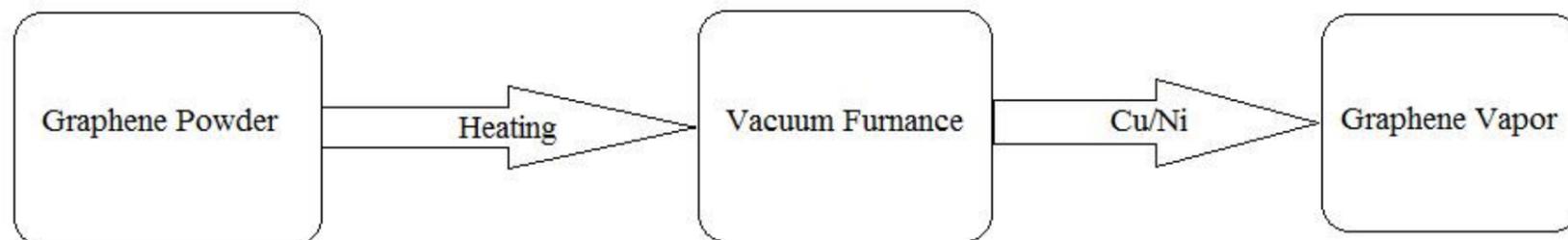


Fig. 18: Flow process of Graphene vapour

10. CONCLUSION

In this review paper, properties and applications are highlighted, and the experiment conducted on the material is also lightened. After a lengthy discussion, it can be said that graphene being a 2D material has shown its values in lots of different fields and yet a lot to be discovered by the scientist of various country. Graphene is one of those material which is researched daily to discover more and more properties. Graphene has several attractive characteristic owing to its unique bonding and mechanical properties. Currently this materials considered as the novel material for distinct applications such as electronics engineering, biomedical engineering, physics, material science, chemistry, nanotechnology etc. Due to its better mechanical, physical and thermal properties, Graphene and its derivatives have shown wonderful commercial applications within a short time period in the field of composites, nanoelectronics, biosensors, etc.. It can be used as sensing application too which works in in-vitro and in-vivo parameters. Graphene being the lightest, strongest, 2D material have opened the gate for new research and experiment field for the sustainability of coming generation technology. However, more research is required for other industrial application. However with increase in Graphene research it is important to take in vivo and in vitro condition into consideration which is becoming quiet challenging for different researches.

Graphene is an inspiration for all 2D materials, which includes boron nitride, Germanene, Silicene, Borophene are emerging as a future scope of research. Thus in this way the materials will be becoming more proficient in the field of nano-technology and challenging for future researches to work upon them. However these materials will be a opportunity for future scientist to research and development.

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The potential biopesticide toxicity test of *Ipomoea batatas* (L.) Lam (*Purple Sweet Potato leaf extract*) against *Artemia salina* Leach larvae using the *Brine Shrimp Lethality Test Method*

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Abstract- *Ipomoea batatas* (L.) Lam (Purple Sweet Potato) can grow and breed in various regions in Indonesia that can be used as food preparations and animal feed. The phytochemical content of *Ipomoea batatas* (L.) Lam (Purple Sweet Potato) includes flavonoids, tannins, saponins, and alkaloids. The content of phytochemical compounds can be potential as a biopesticide. The biopesticides are pesticides that are made by utilizing natural ingredients derived from plants. This study aims to determine the toxicity of LC₅₀ *Ipomoea batatas* (L.) Lam extract which can be potential as a biopesticide. *Ipomoea batatas* (L.) Lam was extracted using 70% ethanol solvent. The dilution was carried out with the concentrations used, namely 100 ppm, 250 ppm, 500 ppm, 750 ppm, 1000 ppm, and negative controls. This research is true experimental research using the Brine Shrimp Lethality Test method. The exposure of *Ipomoea batatas* (L.) Lam extract to *Artemia salina* Leach larvae was carried out for 24 hours. The results showed mortality at a concentration of 100 ppm is 63%, 250 ppm is 66%, 500 ppm is 73%, 750 ppm is 100%, and 1000 ppm is 100%. Then the data analysis uses EPA Probit Analysis program version 1.5 Used for calculating LC/EC values. The results showed that *Ipomoea batatas* (L.) Lam extract had an LC₅₀ of 120.75 ppm which was categorized as moderate toxic and could potentially be a biopesticide.

Index Terms- Biopesticide, *Ipomoea batatas* (L.) Lam, *Artemia salina* Leach, *Brine Shrimp Lethality Test* method, Toxicity of LC₅₀, secondary metabolites

I. INTRODUCTION

The biodiversity in Indonesia is very abundant, one of which is purple sweet potato (*Ipomoea batatas* (L.)). The content of purple sweet potato leaves includes calcium, vitamin B, beta-carotene, protein, zinc, and iron and secondary metabolite compounds are the flavonoids, tannins, alkaloids, and saponins. These secondary metabolites can function as anti-inflammatory, anti-bacterial, and anti-fungal antioxidants. Secondary metabolites produced by various types of plants can be potential as a substitute for synthetic pesticides. ⁽¹⁾

The content of secondary metabolites: Flavonoids have the ability to poison the insects through the inhibition of the respiratory system, Saponins are poisons toxin that can have antioxidant and antibacterial effects through the mechanism of increasing catalase formation, Alkaloids are stomach poisons that inhibit the digestive system chains, Tannins have the ability to bind protein, so it can be anti-bacterial.⁽²⁾ The cytotoxic properties of a metabolite compound in plants can be determined based on the results of the brine shrimp lethality test which is the number of *Artemia salina* Leach larvae mortality on exposure to the concentration of the test compound.⁽³⁾ A plant extract can be said to be toxic or toxic if it has an LC₅₀ value of less than 1000 µg / ml after 24 hours of exposure. ⁽⁴⁾

Biopesticides are pesticides that are made by utilizing secondary metabolites produced by organisms. Biopesticides are generally used to control pests because they are insecticidal. ⁽⁵⁾ Exploration of potential metabolites as biopesticides can be done by using the Brine Shrimp Lethality Test. the Brine Shrimp Lethality Test Method is a method as a preliminary test to determine the toxicity of a metabolite compound that has potential as a biopesticide.⁽⁶⁾ The Brine Shrimp Lethality Test method is the method that is easy to apply, relatively inexpensive, does not require aseptic conditions and the results can be scientifically justified.⁽⁷⁾

II. METHODS

This research was conducted in the Laboratory of Environmental Health, Faculty of Health, Dian Nuswantoro University, Semarang, which was conducted from May to June 2020.

1. **Identification of Secondary Metabolites.** Identification of total metabolite compounds by UV-Vis spectrophotometry method in the range of wavelength 400 - 450 nm, continued by making a standard curve and determining the levels of the metabolite compounds.⁽⁸⁾
2. **Brine Shrimp Lethality Test.** This study is a true experimental study with the Brine Shrimp Lethality Test method. The independent variable in this study is the

concentration of purple sweet potato leaf extract and the dependent variable is the number of mortality of *Artemia salina* Leach larvae (LC₅₀). The sample size used was 160 *Artemia salina* Leach larvae, with each test tube included 10 *Artemia salina* Leach larvae for the testing process. The *Artemia salina* Leach larvae used were 48 hours old and randomly taken. This research was

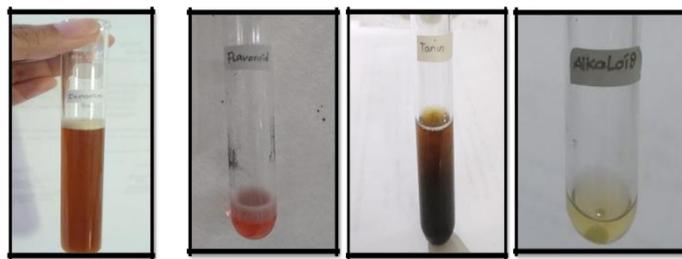
conducted 3 times of replication. Extract concentrations used are 100 ppm, 250 ppm, 500 ppm, 750 ppm, 1000 ppm, and one as a negative control. Mortality data obtained were then further analyzed using microsoft office excel with a regression test to determine the LC₅₀ Probit value. ⁽⁹⁾

III. RESULT

Based on the research results obtained as follows:

Table 1. Phytochemical test results

Parameter	Reagent ingredients	Changes observed	Results
Saponin	Sampel + Aquadest	Formed foam that does not disappear for more than 1 minute	+
Flavonoids	Sampel + Mg + HCl	Red formed	+
Tannin	Sampel+ FeCl3 10%	Greenish black formed	+
Alkaloids	Sampel + Cloroform+ Ammonia + H ₂ SO ₄ + Mayer reagent	White sediment formed	+



(1) Saponin (2) Flavonoids (3) Tannin (4) Alkaloids

Table 2. Brine Shrimp Lethality Test Results

Concentration	Test 1		Test 2		Test 3		Total Dead	Average mortality ± standard deviation	% Dead	Log concentration	Probit Value
	+	-	+	-	+	-					
Control	10	0	10	0	10	0	0	-	0%	-	-
100 ppm	3	7	2	8	6	4	19	0,63	63%	2,00	5,33
250 ppm	3	7	3	7	4	6	20	0,66	66%	23,979.00	5,44
500 ppm	4	6	1	9	3	7	22	0,73	73%	26,990.00	5,58
750 ppm	0	10	0	10	0	10	30	0,10	100%	28,751.00	8,09
1000 ppm	0	10	0	10	0	10	30	0,10	100%	3.00	8,09

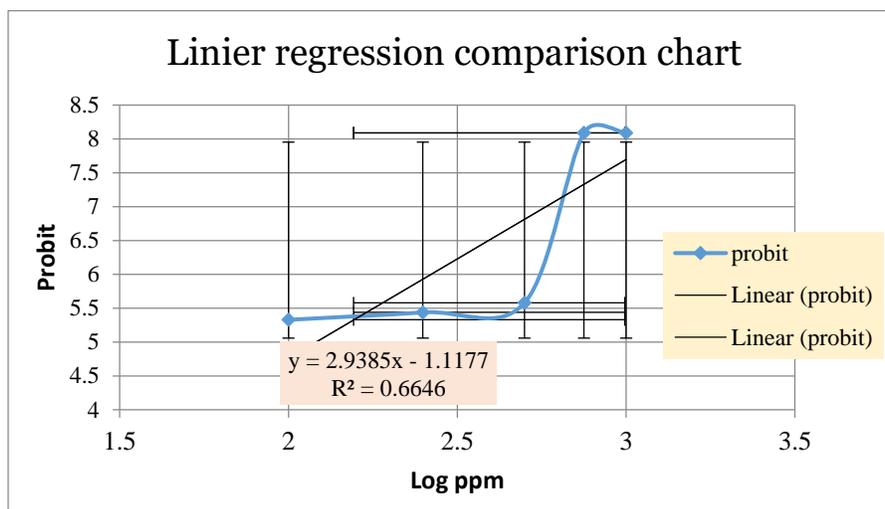


Figure 1. Linear regression comparison chart

Based on the results of the regression calculations obtained:

$$a = 2,938$$

$$b = -1,117$$

$$r = 0,664$$

Regression equation: LC50 Value: $y = ax + b$

$$\log \text{LC50 (y)} = 5$$

$$y = ax + b$$

$$y = 2,938x + (- 1,117)$$

$$5 - (-1,117) = 2,938x$$

$$6,1177 = 2,938x$$

$$X = 2,0822$$

$$\text{LC50} = \text{Antilog } 2,0822$$

$$\text{LC50} = 120,75 \text{ ppm}$$

IV. DISCUSSION

Ipomoea batatas (L.) Lam (Purple Sweet Potato) can grow in various regions in Indonesia, including in the Boja region of Central Java where most farmers plant purple sweet potato leaves. In addition to the fruit consumed, the leaves can also be used as processed vegetables but now people rarely use sweet potato leaves. Based on interviews with farmers that sweet potato leaves during the growth process produce fruit (purple yam) leaves that grow will be denser with creeping and usually only cut it to facilitate the process of taking cassava when it is harvest time. In addition, purple sweet potato leaves are used for livestock clothing.⁽¹⁰⁾ The existence of sweet potato leaves can make the idea of making biopesticides.

Ipomoea batatas (L.) Lam (Purple Sweet Potato leaf extract) in maintaining its survival is to do primary metabolism, the results of primary metabolism in the form of primary metabolites such as carbohydrates, proteins, fats, vitamins, and minerals, but in addition to the existence of primary metabolism, also do Secondary metabolism results from primary metabolite precursors. The secondary metabolism produced by *Ipomoea batatas* (L.) Lam (Purple Sweet Potato leaf extract) is used in maintaining its life from the disturbance of the external environment. Secondary metabolism results in the form of Saponins, Alkaloids, Tannins, and Flavonoids. Secondary

metabolites that have pharmacological bioactivity called bioactive compounds that can be used as anti-bacterial and biopesticide precursors⁽¹¹⁾

Extraction of *Ipomoea batatas* (L) Lam (Purple Sweet Potato Leaf)

This study used purple sweet potato (*Ipomoea batatas* (L) Lam) leaves obtained from a garden in the Boja area, Semarang, Central Java. Test sample through the extraction process with the maceration method so that it is obtained *Ipomoea batatas* (L) Lam (Purple Sweet Potato Leaf). The extract is used for identification of secondary metabolites and brain shrimp lethality test⁽¹²⁾. The phytochemical test of *Ipomoea batatas* (L) Lam (Purple Sweet Potato Leaf) aims to test the content of chemical compounds present in the extract of *Ipomoea batatas* (L) Lam (Purple Sweet Potato Leaf). Based on phytochemical tests that have been carried out, it is obtained the results of the content of flavonoid, alkaloids, saponins, and tannins.⁽¹³⁾

Phytochemical test results show that the leaves of purple sweet potato (*Ipomoea batatas* L) contain positive flavanoid, this is characterized by the occurrence of a blackish red color after the test extract is added with concentrated HCl. (Kohyama et al., 2017) Blackish red color in the flavanoid test due to the formation of flavilium salts.⁽¹⁴⁾

The tannin content in the phytochemical test is characterized by a change in color to green when adding 1% FeCl₃ solution, this

is because 1% FeCl₃ reacts with one of the hydroxyl groups present in the Tannin compound. FeCl₃ 1% reagent was used to identify Tannin compounds with indicators of the formation of blackish green (Muthukumaran et al., 2016).⁽¹⁵⁾

Detection of the presence of alkaloid compounds is characterized by the formation of a yellowish-white precipitate after the extract is added with a major reagent, it is estimated that nitrogen in the alkaloids will react with K⁺ metal ions from potassium tetraiodomerkat (II) to form a precipitating potassium-alkaloid complex⁽¹⁶⁾. The presence of Saponin content is characterized by the formation of foam/froth for ± 10 minutes after adding aquadest. Compounds that have polar and nonpolar groups will be active on the surface so that when a saponin is shaken with water it can form micelles, the polar group faces outward while the nonpolar group faces inward so that it doesn't look like foam.⁽¹⁷⁾

Flavonoids are a group of phenol compounds that are mostly found in nature. These compounds are responsible for red, purple, blue, and yellow dyes in plants. Most of the flavonoids found in plants are bound to sugar molecules as glycosides and in mixed compounds. Flavonoid chemical compounds can be anti-bacterial because they can inhibit the synthesis of nucleic acids, inhibit cell membrane function and inhibit energy metabolism⁽¹⁸⁾

Tannin is a secondary metabolite compound found in purple sweet potato plants. Tannins are able to bind to proteins and are protective of proteins from the degradation of microbial enzymes and protease enzymes so tannins can be antibacterial⁽¹⁹⁾

Saponins are steroidal glycoside compounds or triterpenes found in *Ipomoea batatas* (L) Lam (Purple Sweet Potato Leaf) which can act as a defense mechanism for plant bodies. Saponins are easily soluble in water, insoluble in ether, have a bitter taste, and cause irritation to the mucous membranes of organisms. Saponin is a poison that can destroy blood vessels or hemolysis in the blood, therefore saponins can be anti-bacterial and anti-fungal.⁽²⁰⁾

Alkaloids are secondary metabolites that are found in *Ipomoea batatas* (L) Lam (Purple Sweet Potato Leaf) tissue. Almost all alkaloids come from plants that are widespread and most are included in higher plants. Alkaloids are alkaline organic compounds found in some classes of plants, are bitter, and are insect repellents. Alkaloid compounds as biopesticide or anti-insects play a role by damaging the insect's protein structure, disrupting the nervous system's work and being toxic to insects⁽²¹⁾⁽²²⁾

Toxicity Test of *Ipomoea batatas* (L) Lam (Purple Sweet Potato) with the Brine Shrimp Lethality Test method

An acute toxicity test can be performed using the Brine Shrimp Lethality Test method. The Brine Shrimp Lethality Test method was chosen because it is relatively inexpensive and relatively easy to work with. Brine Shrimp Lethality Test Method is a method in biological tests for screening in determining the toxicity of an active plant that is by using the *Artemia salina* Leach test The Brine Shrimp Lethality Test test is an LC₅₀ test method using the *Artemia salina* Leach larvae as a test animal for 24 hours of exposure to the seawater environment, to determine the toxicity and biological tests of bioactive compounds from secondary metabolites produced by of *Ipomoea batatas* (L) Lam (Purple Sweet Potato)⁽²³⁾.

Based on the results of the mortality test extract of *Ipomoea batatas* (L) Lam with a concentration variation of 100 ppm with the results of the percentage of deaths is 63%, the concentration of 250 ppm with the results of the percentage of deaths is 66%. %, the concentration with the result of the death percentage of 500 ppm is 73%, the concentration of 750 ppm with the mortality rate is 100%, and the concentration of 1000 ppm with the mortality rate is 100%, after knowing the percentage of deaths for each concentration, LC₅₀ was searched using Microsoft Office Excel. LC₅₀ results of 120.75 ppm which are included in the category of moderate toxic. (Used to calculate LC / EC values)

Based on the phytochemical test results of purple sweet potato leaves (*Ipomoea batatas* (L)) have secondary metabolite compounds namely alkaloids, flavonoids, saponins, and tannins. The compound is thought to function as an insecticide. (LC₅₀) values of secondary metabolites obtained Lethal Concentration 50 (LC₅₀) which is 120.75 ppm which is included in the category of moderate toxic. According to the major category of toxicity, bioactive compounds based on (LC₅₀) values are category values (LC₅₀) (ppm) very toxic <30, category values (LC₅₀) (ppm) between 30-1000 are toxic and category values (LC₅₀) (ppm) > 1000 are categories not toxic⁽²⁴⁾

In the toxicity test, an appropriate test animal is needed, the test animal used in the study is *Artemia salina* leach. *Artemia salina* leach is one of the widely used and relevant test animals in several scientific fields such as ecology, physiology, ecotoxicology, and genetics because *Artemia salina* has a short life cycle, the ability to adapt to a wide range of salinity and extreme temperatures, short life cycle, high adaptability to adverse environmental conditions, reproductive parthenogenesis, small body size, and simple body organs. *Artemia salina* has a cell wall formed from the exoskeleton of very simple chitin so that secondary metabolite compounds can destroy the walls of *Artemia salina* and cause the death of *Artemia salina*. Death of *Artemia salina* can also occur through an osmoregulation mechanism. *Artemia Salina* will swallow the medium with a filter-feeding mechanism. So that it will swallow the surrounding media both toxic and non-toxic, including secondary metabolites (bioactive) produced by *Ipomoea batatas* (L) Lam can easily enter the body of *Artemia salina* and cause death.⁽²⁵⁾

Secondary metabolites that damage the cell wall and cell membrane by inhibiting enzyme synthesis or inactivation of the enzyme, thereby causing loss of cell wall viability and cell membrane causing cell lysis. The secondary metabolite compounds inhibit cell wall synthesis mainly by interfering with the synthesis of peptidoglycan, this causes the cell walls in *Artemia salina* to become lysis and cause death.⁽²⁶⁾ Secondary metabolites in small doses can have pharmacological effects and have toxic effects on Test animals (*Artemia salina*). Secondary metabolites have the potential for acute toxicity and can cause larval death of *Artemia salina* Leach. The mechanism of larval death is related to the function of secondary metabolite compounds which can inhibit the feeding power of larvae/antifeedants which act as stomach poisoning, causing the death of *Artemia salina* Leach⁽²⁷⁾

V. CONCLUSION

Ipomoea batatas (L.) Lam or Purple sweet potato leaf extract is medium toxic with LC₅₀ value of 120.75 ppm as an antibacterial, not yet toxic enough to be an alternative biopesticide. Further research is needed to determine the effectiveness of secondary metabolites of flavonoids, tannins, alkaloids, and saponins quantitatively.

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AUTHORS' CONTRIBUTION

This research was conducted in the environmental health microbiology laboratory, Dian Nuswantoro University in collaboration between two authors, OAS and SI. OAS writers conduct research designs, analyze research results, write drafts of initial scripts. Authors SI and S manage the research analysis. The SI author manages the search literature and manages the final research report draft corrections. Both authors have read and agreed to the final draft of this article.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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AVAILABILITY OF DATA

All datasets generated or analyzed during this study are included in the manuscript.

ETHICS STATEMENT

Not applicable.

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Impact of the Training (Analysis, Design, and Development) on Employee Performance (Execution Skill, Knowledge, and Adapt to Work)

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Abstract

With the dramatic increase in competition between firms, organizations use employee training to improve their employee's performance and therefore the life of organization. Performance of employees is crucial in this aspect for the well-being of the organization. The main objective of the current study is to find the significance of training to improve the employee performance. The study population is composed of the personnel in three companies in Libya (Africa Engineering and Projects Company, Libya Investment Embracement Company and Africa Trade & Investment Company). The size of the study population reaches 1016 individuals. 287 responses were usable. PLS (Partial Least Squares) SEM-VB (Structural Equation Modelling-Variance Based) was employed to assess the research model by utilizing the software SmartPLS 3.0. results show that training (analysis, design, development) has a significant impact on the employee performance (execution skills, knowledge, adapt to work). The results shed some light on the importance of the training to improve the employee performance in the public sector in Libya.

Keywords: Training; employee performance

1. Introduction

Training is an important factor in the modern institutions and directly affects the employee performance. Training turned into a main part of the strategies of human resources in the business employees and governmental administrations and cannot be realized unless through the availability of accessible material potentialities and the qualifying cadres for training and the division of the training programs, that shall be designed and executed, as per the necessities of the employee (Altrawna, 2012) whereas training contributes significantly in the achievement of the goals and strategies of the institution and on the other hand, the changes may lead to the aging of skills learnt within a short period of time, whereas the employee changes and expansions pertaining to the sector of business through the introduction of modern technology in the various aspects of business increases the need of the individual for the update of his skills and gain new skill through elaborate training programs as per methodological and scientific bases (Rawia, 2005).

Altalbani et al. (2011) points that the inability to develop the employee performance in the Libyan employees in general is due to the lack of desire of taking hold of the scientific manners and modern teaching methods that are convenient for the work of the employee and also the unconcern for evaluating the methods and manners of modern training before proceeding in the start of such programs, which is corroborated by the study of Tawfik (2007) and Alzaed (2009).

According to the international indicators for the year 2015, they indicate the unconcern for the factor of training in the Libyan establishments in comparison with the countries of the world and comes in order 143 in training out of 144 countries and in case of its comparison with the Arabic countries, it order comes as the last of the Arabic countries. Find enclosed the illustrative table (the international indicators, 2015).

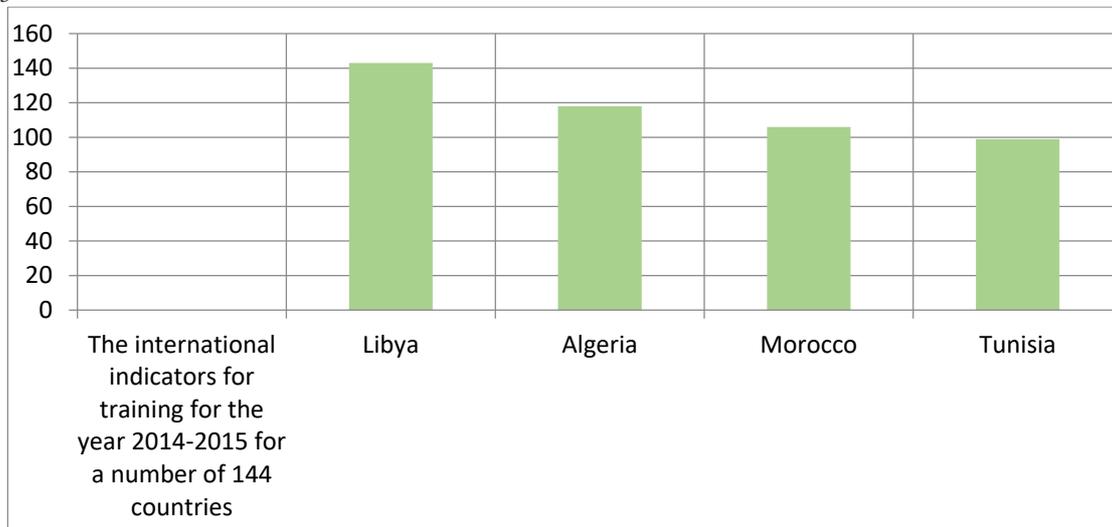


Figure 1.1: the international indicators of training

Therefore, the study shall discuss the problem represented in the weakness of functional performance and inability to develop the skills of the personnel and their knowledge in the field of business because of the improper application of the appropriate training for the establishment and lack of exercising training as per the modern methods together with the negligence in evaluating the results of training programs by the management of the establishment. The main objective of the current study is to examine the impact of training on the employee performance in public companies for construction, building and roads in Libya.

2. Literature Review

2.1 Employee Performance (EP)

Employee performance factor is one of the most significant parameters in the research related to management and perhaps the most significant guide to the overall performance of the employee (Gavrea, Ilies, & Stegorean, 2011). The performance of the employee is a benchmark or an indicator for efficiency, effectiveness, and environmental obligation like productivity, time of cycle, reduction of waste, and compliance of rules (Muchira, 2013). The large amount of definitions serve to view the performance of the employees as a tool for achieving objectives (Abu-Jarad, Yusof, & Nikbin, 2010; Shahzad, Luqman, Rashid Khan, & Shabbir, 2012) In short, the performance of the employee is the most significant factor in evaluation of employees, their activities, and the environments in which they work. This significance is represented by the continual use of performance of the employee as a dependent parameter in earlier research (Richard et al., 2009). The efficient performance and success of the employee is usually ascribed to exceptional strategy and excellent resources. On the basis of the theory of contingency, there is no best way or method to run employees (Gavrea et al., 2011).

2.2 Training (TR)

Training is meant by setting individuals targeted by training on the correct way (Helal, 2000:28). Training is considered to be one of the important notions (or concepts) in the world of business, particularly in the industrial and productive field, whereas this notion reflects the need for continuous development of experiences and skills of the personnel through developed and successful training programs (Greshi, 2005). Nagm and Talal (2011) define training as being a continuous operation for the promotion of the fields of cultivation of knowledge for the personnel and increase the proportion of gained information and improve their abilities, behaviors and the theoretical, practical and psychological inclinations. Training directly contributes in improving performance and makes gain the organized experience and create the appropriate opportunities in the conduct by expanding the knowledge of the personnel and refine their skills over learning and using the modern means in a job (Elham, 2011). Training is an important factor in arousing vigilance in the individuals and direct attention to the much important issues in the employee (Altelbani, 2011). The attention paid to the training increased in view of the link of this task to the standard of performance by the individual of the position occupied by him and the productive efficiency (Algotha, 2007) (Hael, 2009) (Altelbani, 2011) (Suhaila, 2003). Consequently, the following hypothesis is proposed:

H1: Training has a positive effect on execution skill.

H2: Training has a positive effect on knowledge.

H3: Training has a positive effect on adapt to work.

3. Research Method

3.1 Overview of the Proposed Conceptual Framework

Among the international models used in measuring training programs is ADDIE model as indicated in figure 1. it represents the framework that clarifies the general operations undertaken by the designers and developers of the training programs

(Morrison, 2010). This model may have been developed by a group of researchers in Florida University (Branson et al, 1975). The conceptual framework is depicting the relations suggested by this study based on the literature review.

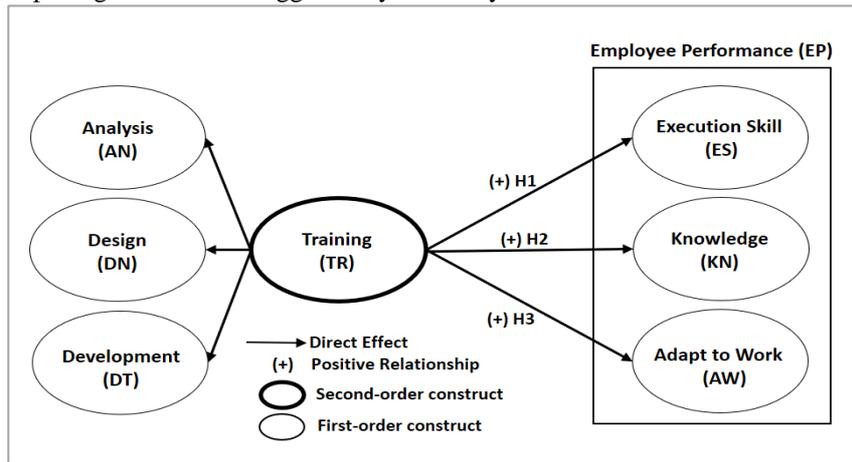


Figure 2: The proposed conceptual framework

3.2. Development of Instrument and Data collection

The study population is composed of the personnel in three companies in Libya (Africa Engineering and Projects Company, Libya Investment Embracement Company and Africa Trade & Investment Company). The size of the study population reaches 1016 individuals. 287 responses were usable. This study has adopted questionnaires to collect data. It was divided into two sections, the first measuring six core constructs using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) (please refer to Appendix A for the instruments), while the second covered the demographic profile of respondents, measured using a nominal or ordinal scale. PLS (Partial Least Squares) SEM-VB (Structural Equation Modelling-Variance Based) was employed to assess the research model by utilizing the software SmartPLS 3.0.

4. Data Analysis and Results

PLS (Partial Least Squares) SEM-VB (Structural Equation Modelling-Variance Based) was employed to assess the research model by utilizing the software SmartPLS 3.0 (Ringle, Wende, & Becker, 2015).

4.1 Measurement Model Assessment

The individual Cronbach’s alpha, the composite reliability (CR), The average variance extracted (AVE), and the factor loadings exceeded the suggested value (Kline, 2010; Hair, Black, Babin, & Anderson, 2010) as illustrated in Table 1.

Table 1: Measurement model assessments

Constructs	Item	Loading (> 0.7)	M	SD	α (> 0.7)	CR (> 0.7)	AVE (> 0.5)
Analysis (AN)	AN1	0.898	3.94	1.01	0.929	0.947	0.781
	AN2	0.921					
	AN3	0.892					
	AN4	0.806					
	AN5	0.897					
Design (DN)	DN1	0.917	3.90	0.99	0.871	0.912	0.722
	DN2	0.891					
	DN3	0.776					
	DN4	Deleted					
	DN5	0.807					
Development (DT)	DT1	0.843	4.05	0.96	0.934	0.950	0.791
	DT2	0.892					
	DT3	0.898					
	DT4	0.911					
	DT5	0.901					
Execution Skill (ES)	ES1	0.904	3.62	1.13	0.916	0.937	0.749
	ES2	0.882					
	ES3	0.814					
	ES4	0.830					
	ES5	0.891					
Knowledge (KN)	KN1	0.871	3.62	1.15	0.912	0.934	0.740
	KN2	0.878					
	KN3	0.852					
	KN4	0.839					
	KN5	0.860					
Adapt to Work (AW)	AW1	Deleted	3.05	1.21	0.944	0.959	0.855
	AW2	0.892					
	AW3	0.931					
	AW4	0.939					
	AW5	0.936					

Note: M=Mean; SD=Standard Deviation, α = Cronbach’s alpha; CR = Composite Reliability, AVE = Average Variance Extracted.

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Key: AN: Analysis, DN: Design, DT: Development, ES: Execution Skill, KN: Knowledge, AW: Adapt to Work

Fornell-Larcker was used to test the discriminant validity, table 2 shows that all constructs of model fulfilled satisfactorily, it was discovered that the AVEs' square root on the diagonals is bigger than the correlations among constructs (Fornell & Larcker, 1981; Chin, 1998; Hair et al., 2017).

Table 2: Fornell-Larcker criterion

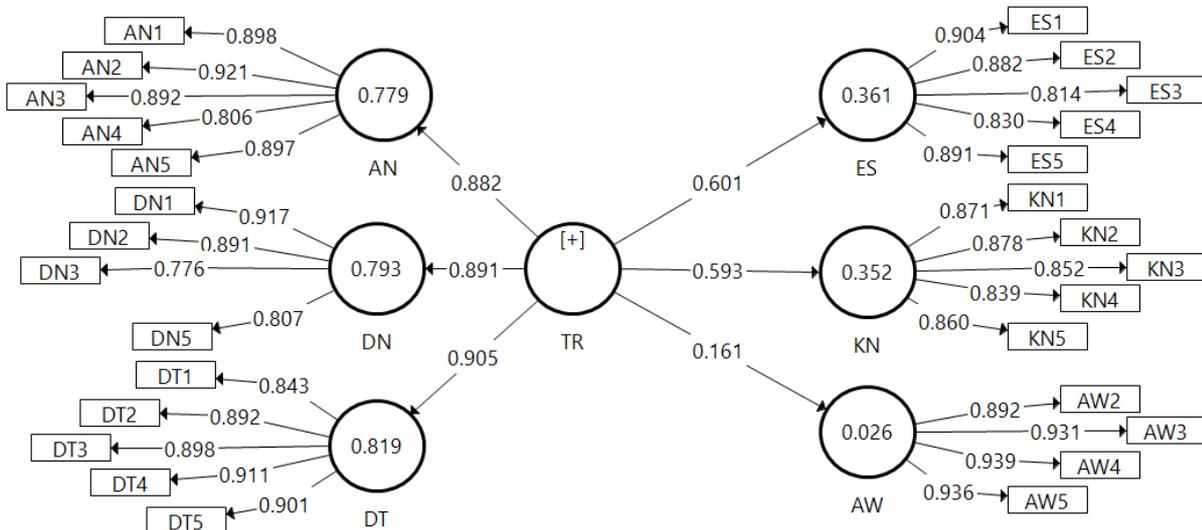
	AN	AW	DN	DT	ES	KN
AN	0.884					
AW	0.129	0.925				
DN	0.682	0.146	0.850			
DT	0.668	0.151	0.738	0.889		
ES	0.476	0.271	0.656	0.491	0.865	
KN	0.454	0.275	0.689	0.462	0.754	0.860

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the correlations.

Key: AN: Analysis, DN: Design, DT: Development, ES: Execution Skill, KN: Knowledge, AW: Adapt to Work

4.2 Structural Model Assessment

The structural model can be tested by computing beta (β), R^2 , and the corresponding t -values via a bootstrapping procedure with a resample of 5,000 (Hair, Hult, Ringle, & Sarstedt, 2017).



Key: TR: Training, AN: Analysis, DN: Design, DT: Development, EP: Employee Performance, ES: Execution Skill, KN: Knowledge, AW: Adapt to Work

Figure 2: PLS algorithm results

Figure 2 and Table 3 showing the results of the hypothesis tests. Training positively influences employee execution skill, knowledge, and adapt to work. Hence, H1, H2, and H3 are accepted with ($\beta = 0.601, t = 12.309, p < 0.001$), ($\beta = 0.593, t = 12.969, p < 0.001$), and ($\beta = 0.161, t = 2.690, p < 0.001$) respectively.

Training explains thirty-six percent of the variance in execution skill, thirty-five percent of the variance in knowledge, and three percent of the variance in adapt to work. The values of R^2 have an acceptable level of explanatory power, indicating a substantial model (Cohen, 1988; Chin, 1998).

Table 3: Result of Direct Effect Hypotheses

Hypothesis	Relationship	Std Beta	Std Error	t-value	p-value	Decision	R ²
H1	TR→ES	0.601	0.049	12.309	0.000	Supported	0.36
H2	TR→KN	0.593	0.046	12.969	0.000	Supported	0.35
H3	TR→AW	0.161	0.060	2.690	0.007	Supported	0.03

Key: TR: Training, ES: Execution Skill, KN: Knowledge, AW: Adapt to Work

5. Discussion

The main objective of this research was to assess the impact of training (analysis, Design, development) on employee's performance (Execution Skill, Knowledge, and Adapt to Work) for the case of public companies for construction, building and roads in Libya.

The study found that training has a significant effect on employee performance (execution skills) with ($\beta = 0.601, t = 12.309, p < 0.001$). This means that, When The organization that, analyze the performance records of the staff before and after the training process to evaluate the training program, compares the level of production before and after the training process to evaluate the training program at the level of organizational results, analyzes the performance levels of the business unit to evaluate the training program at the organizational results level. The more employees are able to work under pressure with high quality, employees can plan and organize my work independently, and the foundation evaluates my work according to the tasks performed.

Likewise, imitability was found to positively affect employee performance (knowledge) with ($\beta = 0.161, t = 2.690, p < 0.001$). This is explained by the fact that, the more Designing training programs are suitable for the work, After completing the training, employee finds that the way the training program was implemented, improved my work skills, The training program is designed to increase the working knowledge of workers, The Foundation brings experts in training to design the training program in the best way, employee found the training methods easy and uncomplicated. The more employee is able to take the initiative at work, employee always accept and learn from my co-workers, employee cooperate with others to do these tasks, employee communicate effectively within the organization (for example, expressing ideas and intentions appropriately), employee has a good working background

Further, organizational aspects were found to positively affect employee performance (adapt to work) ($\beta = 0.161, t = 2.690, p < 0.001$). This is explained by the fact that the more employees see that you need training to do your job better, The Foundation studies the training needs of the employee based on the results of the performance evaluation, employee see that your competence qualifies you to perform higher tasks, Employee see that your job is done easily after the training is over, employee think that the training program you participated in helps you to develop your skills significantly. The more the employee have the flexibility to deal with stress, difficult situations, the employee can offer innovative solutions to new and challenging problems, the employee have the ability to remember everything needed to get the job done completely, The employees in my organization need to constantly update their business skills, the employees are able to deal with unstable and unexpected business situations.

6. Implications

In the modern and complex business environment, employee training and development is one of the reliable sources of competitive advantage to compete with the changing and competitive business world. Training and development are beneficial to employees in particular and the organisation in general. This research work will help organization to understand the importance of training and development. It will also help organization to understand which factors are important to keep in mind during the training and how a good training can be delivered to their employees. It will help them to understand that it is very necessary for them to give training to their employees so that they could perform the assign task in a better way. Above all, it becomes imperative to state that without training, there will be no development. Therefore, for every organization to survive, training must be seen by management as "a means to an end".

Based on the finding of the study the following suggestions are recommended: The employee training and development activity shall be based on a systematically identified knowledge and skill deficit so as it maximizes the effort of both the employee and the organization. second Ensuring adequate budget for training and development activities, utilizing the allocated resources in an efficient manner shall be maintained for organizational success. finally, involving employees in training evaluation activities and taking inputs for future similar activities and document best practices to scale up in similar settings. The impact of training on quality of services and client satisfaction shall be studied

7. Conclusion

Training is important for the survival of any organization. It is also imperative for the effective performance of employees, enhancement of employees' ability to adapt to the changing and challenging business environment and technology for better performance, increase employees' knowledge to develop creative and problem solving skills. Meanwhile, all the relationships proposed among the variables in the research model were tested and it was found that relationship exists amongst the variables having subjected the collected data to empirical analysis with the use of descriptive statistics. However, the results of the findings indicated that training and development affect employees' performance and organizational effectiveness, which implies that effort must be made to ensure that employees' skills and knowledge are fully underutilized through adequate and timely training design and implementation. The overall result showed that proposed hypotheses tested were accepted. It is therefore recommended that individuals should be more proactive and seek to be more creative and innovative to contribute their quota through their profession and skill. Employers of labor and decision-makers should endeavor to create enabling training environments and favorable training policies that will give every worker the opportunity to attend training. Management should also take into consideration the training need of each worker and act as appropriate.

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Nutritional status of physically disabled children

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Abstract-

Proper nutrition is crucial for everyone, but it plays a crucial role in childhood as nutrition is directly linked with all aspects of their growth and development. Therefore, all physical, cognitive and psychological capabilities as adults will be determined by the fetal and childhood nutrition. Disabled children, specifically, are in need of higher need of proper nutrition compared to non-disabled children. Malnutrition problems in disabled child will make he/ she highly vulnerable to further morbidities imposing further suffering of the affected child. Consequently, not only the child he/ herself but also the family and the whole community will suffer both emotionally and financially (Neyestani *et al.*, 2010).

Protection of the Rights of Persons with Disabilities Act.1 A in Sri Lanka has defined disability covering both medical and socio-economic aspects of disability as follows. A person with disability means any person who, as a result of any deficiency in his physical or mental capabilities, whether congenital or not, is unable by himself to ensure for himself, wholly or partly, the necessities of life. It has been proven in the literature that disability and poverty are closely interlinked. Further, families having a disabled child suffered with variety of problems such as child care problems, earning, and negative attitudes from the society and etc. Therefore, these children are less likely to receive proper care and nutrition (National policy on disability for Sri Lanka, 2003).

Index Terms- Nutrition, Physical, disabled, Children.

I. INTRODUCTION

Good nutrition is a fundamental requirement for good physical, mental and social development. Further, nutrition plays a vital role not only in growth and development, but also in the prevention and treatment of disease. Basically, nutrition is the major determinant of proper motor and cognitive functionality (Ohlhorst *et al.*, 2013). The term 'Malnutrition' is generally used when nutrition is deficient, excess or imbalanced and cause adverse effects which can be detected and measured as changes in tissue/ body form, functionality and clinical condition (Younis *et al.*, 2015). Malnutrition is basically two forms, namely, under nutrition and over nutrition. Under nutrition is associated with inadequate consumption of foods, or impaired absorption or utilization of the consumed nutrients. Under nutrition includes four different categories including underweight (low weight for age), stunting (low height for age), wasting (low weight for height) and micronutrient deficiencies (insufficiency of important vitamins and minerals). On the other hand, over nutrition leads to overweight, obesity and diet related non-communicable diseases namely cardiovascular diseases, diabetes mellitus, cancer, etc. (Branca *et al.*, 2015).

Branca *et al.* (2015) further explained that malnutrition shows an intergenerational cycle emphasizing the importance of nutrition at different stages of life as well as across generations. According to Tompsett *et al.* (1999), malnourished children will be grown into an adults with lower physical and intellectual capacity and productivity as well as higher rates of chronic illness and disability. At the same time, malnourished mother will give birth to malnourished or disabled children indicating the intergeneration transmission. Following figure illustrate the phenomenon of life stage and intergenerational progress of malnutrition and possible consequences.

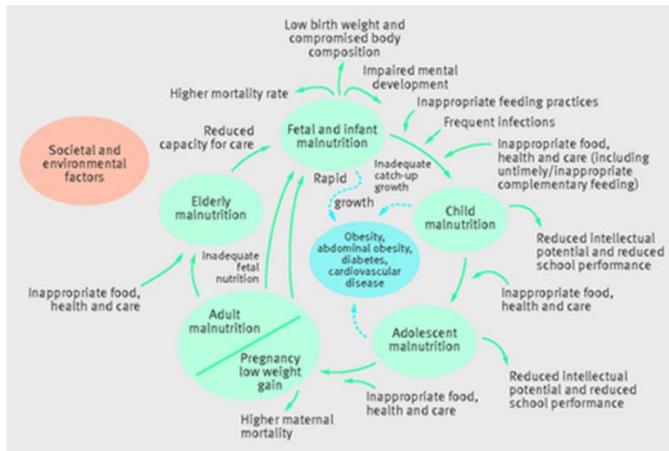


Figure 1: Effects of nutrition through the life stages and generations (Darnton-Hill et al., 2004)

Nutritional status has defined as “Intake of a diet sufficient to meet or exceed the individual requirements in order to keep the composition and function of the otherwise healthy individuals within the normal range” (Jeejeebhoy et al., 1990). Assessment of nutritional status is important to identify individuals or population groups who are at risk of becoming malnourished, identify individuals or population groups who are already malnourished, develop programs to meet the individual/ family nutritional demands identified by the assessment and assess the effectiveness of the nutritional programs and intervention once initiated. According to the authors this equilibrium can be disturbed by three distinct processes including increased demands, decreased intake and altered utilization. A comprehensive assessment of nutritional status includes (1) anthropometric measurements, (2) biochemical assessment, (3) clinical assessment and (4) measurement of dietary intake (Knox et al., 2003).

Anthropometrics assessment measures the body composition, specifically the body muscle and fat and can be used to compare and evaluate the growth of individuals and population groups. Most frequently used anthropometric measurements are height and weight, in addition, body circumferences (head, mid upper arm, thigh, hip, etc.) and skin fold thicknesses of different body parts (triceps, biceps, abdominal, subscapular, suprailliac, and etc.) are also used. Further, these anthropometric measures will be used to calculate variety of growth indices such as Body Mass Index (BMI), weight for age, height for age, weight for height, percent body fat, muscle mass, etc. will be derived from these measurements which are important in determining the body composition and overall nutritional status (Mackey, 2017).

Biochemical tests are to determine the different nutrient and metabolic parameters in blood and urine which indicate the nutritional status such as serum proteins, micronutrient levels, etc. Clinical assessment will provide information about altered nutritional requirements and resulted acute and chronic illnesses. Variety of techniques will be used to assess dietary intake including 24 hour dietary recalls, diet diary, food frequency questionnaire, and etc. However, accuracy and reliability of these dietary assessment methods are questionable compared to other methods as techniques used in these methods (interviews,

observations, records of study participants, etc.) can indirectly change the actual and habitual intake (Mackey, 2017).

According to Branca and colleagues (2015), nearly 50 million children’s lives are at risk every year, due to undernutrition while more than 40 million children are threatened by overweight and obesity at the same time. This point out the simultaneous existence of different forms of malnutrition across the same communities, which is referred to as double burden. Second Global Strategy for Women’s, Children’s and Adolescents’ Health (2015) also warrants the improving nutrition to improve health by paying special attention to the first 1000 days of life, pregnant and lactating women, women of reproductive age, and adolescent girls. According to Younis, Ahmad and Badpa (2015), the hidden causative factor behind more than one third of all child deaths around the world is malnutrition, however it is rarely mentioned as a direct cause. All these facts point out the importance of proper nutrition for children. Therefore, several studies have conducted to assess the nutritional status of children of all age groups across the world.

Disability means the limitations imposed on individuals restricting their capacity to carry out activities of daily living (ADL) and participation in daily life situations. Therefore, disability in general, constrain the individual from ensuring for himself, wholly or partly, the necessities of life. Disability has classified in to number of categories including hearing, visual, speech, intellectual, psychiatric, mobility and disability arising as a result of epilepsy and other causes. Further, people may be suffering from multiple disability in which two or more of these various disabilities present in a single individual (National policy on disability for Sri Lanka, 2003). Therefore, disable children are identified as a group of children with special needs and require specific caring and support. However, studies focused on their nutritional status are quite limited in the literature.

Neyestani and colleagues in 2010 conducted a cross-sectional study to investigate the nutritional status of the Iranian children with physical disability. In this study they used 24 hour dietary recalls and food-frequency questionnaire to assess the dietary pattern of the disabled children. Further, two anthropometric parameters: height and weight was measured and BMI was calculated to assess nutritional status. They found interesting results through this study, for example mean energy intake of disabled children were more than 90% of the required amount. On the other hand, mean calcium intake was approximately half of the recommended intake while calcium intake was 75% of the required recommended intake. More interestingly, protein, calcium and riboflavin intake found to be significantly lower in disabled girls than disabled boys.

The most important finding of the study of Neyestani and colleagues (2010) is that they found 40% of disabled girls and boys were underweight according to Z score of weight. Moreover, they compared these results with anthropometric data from non-disabled children and pointed out underweight condition is more prevalent among disabled children than non-disabled children ($p < 0.001$). They found the similar results with height too, and stated that both disabled boys and girls have significantly shorter statures when compared with the nondisabled counterparts. Finally, they concluded that certain malnutrition conditions including low weight and stunting shows higher prevalent rate among Iranian children with disabilities and

also this situation is more prevalent in girls than in boys. They further pointed out that major contributing factor for this situation is poor food composition than total low calorie intake and recommended further studies.

However, another study found opposite results. Tompsett, Yousafzai and Filteau in 1999 studied the nutritional status of disabled children in Nigeria by applying cross-sectional survey design. In this study, they compared the nutritional status of disabled children in Nigeria with their non- disable counterparts including siblings and neighbor children to determine whether disabled children were nutritionally disadvantaged. In this study, they used anthropometric measurements such as height, weight, mid-upper arm circumference (MUAC), demispan and halfspan and also biochemical measurement of blood hemoglobin level.

The results of the study revealed that mean height for age and weight for age of disabled children under 10 years was significantly lower than the non- disable counterparts. However, they pointed out that these results are mainly due to presence of neurological impairments, polio, feeding difficulties, etc. making them highly nutritionally vulnerable. Based on these results they concluded that there is no significant difference in nutritional status of disabled children who are not nutritionally at risk due to neurological impairments and consequent feeding difficulties when compared with the non-disable children in the same area. More interestingly, they compared the individual impairment groups and pointed out that nutritional status of children with sensory impairment and learning difficulties do not have significant difference from non – disable children.

Conclusion

Children are considered as the most precious group in any kind of society. Growth and development during childhood will determine the future adult, in which nutrition plays a vital role. Especially, children with disabilities do need a special care and attention to fulfil their special needs. Therefore, close relationship of the disability and poverty may lead to nutritional problems among these children and the expected prevalence rate of malnutrition problems among disabled children are higher. Therefore, having a basic idea about the current prevalence rate of malnutrition or other nutrition related problems is vital in order to improve their health considering the equity of the society.

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Groundwater quality in parts of Ado-Ekiti Metropolis, South-Western Nigeria

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Abstract- Twenty-five (25) samples of groundwater sourced from boreholes and hand-dug wells were analyzed for twenty-three (23) physical and chemical parameters namely; Total hardness, Total dissolved solids (TDS), Conductivity, pH, Colour, Alkalinity, Turbidity, Nitrate (NO_3^{2-}), phosphate (PO_3^{2-}), Sulphate (SO_4^{2-}), Fluoride (F⁻), Bicarbonate (HCO_3^{-}), Calcium (Ca), Potassium (K), Magnesium (Mg), Zinc (Zn), Sodium (Na), Iron (Fe), Manganese (Mn), Copper (Cu), Lead (Pb), Aluminum (Al) and Chloride (Cl) to determine their levels of portability and if the physico-chemical parameters fall within acceptable levels.

Results show that most of the physical and chemical parameters are within acceptable limits as recommended by some regulatory organizations including the Nigeria Standard for Drinking Water Quality (NSDWQ) and World Health Organization (WHO). It was also observed that the order of abundance of the various cations was $\text{Ca}^{2+} > \text{Mg}^{2+} > \text{K}^+ > \text{Na}^+ > \text{Fe}^{2+}$ for well and borehole samples and $\text{SO}_4^{2-} > \text{Cl}^- > \text{NO}_3^- > \text{PO}_4^{3-} > \text{HCO}_3^- > \text{F}^-$ for the anions which generally agrees with the empirical pattern of mobility in secondary environment in natural water. The order of dominance of the trace elements was found to be $\text{Mn} > \text{Zn} > \text{Cu} > \text{Pb} > \text{Al}$ and it is similar in both hand-dug well and borehole water samples. T-test results also showed that the differences in the concentrations of the measured parameters in both sample types (hand-dug wells and boreholes) are not significant. It was also observed that Mg-type water is predominant for cation concentration while Chloride and Sulphate type waters are predominant for the anion concentration for the two sample types. In addition, the Water Quality Index (WQI) values revealed that all the borehole water samples fall under the medium category while a few of the well samples fall under the Bad category and the rest under the Medium category.

Conclusively, the groundwater in some parts of Ado-Ekiti can be considered as safe for domestic, agricultural and industrial usage although purification procedures should be carried out on some of the waters.

Index Terms- Groundwater, hand-dug wells, borehole, physicochemical

I. INTRODUCTION

Water is one of the most important endowments of nature. It is a priceless commodity without which plants and animals cannot survive hence it is an element that demands rigorous scientific qualification and analysis (Brown, 1971). Making up more than two-thirds of the weight of the human body, water regulates the metabolism and mechanics of the body.

Water occurs either as surface water in the form of streams, lakes, glaciers, oceans and seas which makes up about 94% of the total volume of water in the world or as subsurface/groundwater; which is the subject of this study. It is defined as water found below the surface of the ground and constitutes about 4% of the remaining volume of water. Groundwater constitutes the largest reserve of drinkable water in human habitats, hence, it is of major importance to civilization. Its mild susceptibility to bacterial pollution sets it apart from other sources of water because the soil and rocks which serve as conduit and storage, filters out most of the bacteria. The microbial load of groundwater is significantly low and very rarely exceeds tolerable level (David and Dewiest, 1966). In parts of Africa, Asia, Central and South America, the dependence on groundwater cannot be overemphasized and the past five decades have seen an unmatched development of groundwater resource. Globally, it is estimated that over two billion persons source their drinking water supply from aquifers (Morris et al., 2003).

Ado-Ekiti, the capital city of Ekiti State in Southwest Nigeria with an estimated population of 1million people has a landmass of about 5435 sq.km. (NIMET, 2007). The town is linked with a fairly good road network which provided easy access to the sampling points. The increase in population and technological development has put a strain on the available water resources hence more boreholes and wells are being sunk to alleviate the water problems. Some workers have previously investigated the groundwater quality in Ado-Ekiti metropolis. Awopetu and Baruwa (2017) carried out an appraisal of the groundwater quality in Ado-Ekiti. Using samples collected from ten hand dug wells, they observed that most physico-chemical and bacteriological parameters analyzed were observed to be inconsistent with the Nigerian standard for drinking water quality as well as that of the World Health Organization (WHO).

Oyedele et al., (2019) characterized shallow basement aquifers in parts of Ado-Ekiti and carried out a groundwater quality assessment using samples collected from hand dug wells. The relative mean concentration of the cations were observed to be in the order $\text{Na}^+ > \text{Mg}^{2+} > \text{Ca}^{2+} > \text{K}^+$ while the anions were in the order $\text{Cl}^- > \text{HCO}_3^- > \text{SO}_4^{2-} > \text{NO}_3^-$. Bacteriological analyses revealed that E. Coli

tested positive in all the samples although their colonies were classified dominantly as satisfactory pollutant free state. Anthropogenic activities (such as waste disposal), Weathering, ion-exchange processes were posited to have great influence on the groundwater quality.

1.1. Location of Study area

Ado-Ekiti is in the south-western part of Nigeria lying between latitudes 07°36'N and 07°49'N and longitudes 05°13'E and 05°16'E. (Figure 1)

1.2. Geology of Study Area

Metamorphic Rocks of the Precambrian basement complex underlay the subsoil. These rocks show great variations in grain size and mineral composition. They range from quartz gneisses to schists consisting essentially of quartz with small amounts of white micaceous minerals. In terms of structure and grain size, the rocks vary from coarse grained pegmatites to medium grained gneisses. (Smyth and Montgomery, 1962). The study area is mainly underlain by crystalline rocks which Rahaman (1988) grouped into four lithologic units namely;

- I Migmatite-Gneiss-Quartzite complex
- II Charnokitic, gabbroic and dioritic rocks
- III The older granite suite and
- IV Unmetamorphosed dolerite dykes

The dominant lithologies include coarse grained charnockites, fine to medium grained granite, porphyritic biotite hornblende granite and superficial deposits of clay and quartzite. Omotoyinbo (1994) suggested a contemporaneous relationship between the fine grained charnockite and the porphyritic biotite hornblende granite due to their association.

The colour of the charnokitic rock ranges from dark-green to greenish-grey with milky quartz and greenish feldspar. The coarse grained charnockite in Ado-Ekiti bears a striking similarity to the exposures Oyawoye (1972) described as 'Bauchite' which are found in Bauchi, Nigeria.

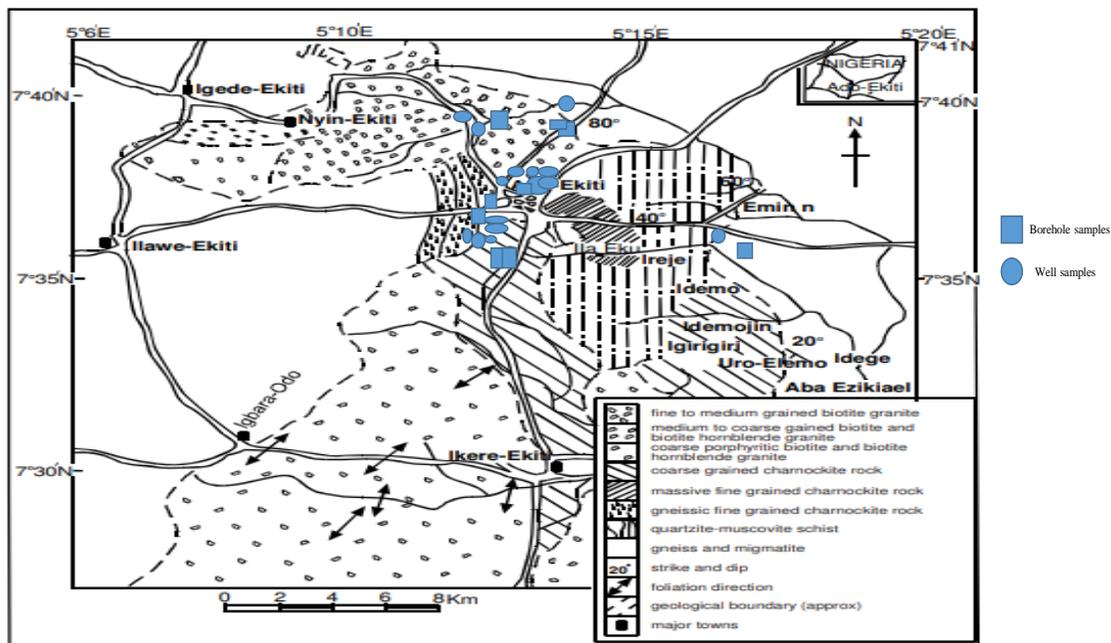


Figure 1: Geological map of Ado-Ekiti showing the sampling points (adapted from Olarewaju et al., 1987)

1.3. Hydrogeological setting of the study area

The study area is underlain by the crystalline basement complex rocks of south-western Nigeria which comprises of granites, migmatite gneisses, charnockites and quartzites. The soil types are categorized into top, loamy and clayey soils. The location of most of

these rock types in lowland and highland terrains is responsible for the high runoff and very low infiltration rate. The intensity of fracturing of the underlying rock and degree of weathering determine the hydrogeological characteristics of these rock types especially within the tropical rain forest belt. The fracturing responses of rocks to mechanical deformation coupled with the development of secondary porosity and permeability due to weathering make up the good aquifer properties needed to store and transmit water. This could be responsible for the varying hydrogeological properties of the different rock types in the area hence, the quartzite belts are considered as good aquifer materials. Although the aquifers may contain groundwater in large quantity, the capacity of each well may be low due to intense anisotropy which results in diminished transmissivity within each well, hence, the capacity of the wells do not reflect the total groundwater potential of the area within the basement complex.

The hydraulic barriers of the boundaries, geology of the area, hydrogeologic structures (such as groundwater divides, ground flow, aquifer thickness and extent) and hydraulic parameters of porosity, permeability and stability are factors that determine the storage and circulation of groundwater.

Surface precipitation (rainfall, snow, hail etc.) and lateral flow from rivers and their tributaries are the means by which groundwater is recharged. The Ureje River is the prominent river in the area.

1.4. Water quality

Water quality encompasses the condition of water relative to the requirements of plants, human, animals and other biotic species as well as the physical, chemical and biological characteristics of water. Water quality is also often defined by the simple property of 'pollution' i.e. whether water is polluted or not. Pollution may be geogenic, anthropogenic or both. What use water is intended for determines the parameters for measuring its quality although it is often focused on human consumption, industrial use and the environment.

Groundwater quality is as important as its quantity (Hamill and Bell, 1986) and although it is located in the subsurface beyond human view, yet it is subject to pollution. Typical sources of groundwater pollutants are septic tank disposal systems, landfills, sewage treatment lagoons, industrial sources and chemical plants. High concentrations of some dissolved mineral constituents can be dangerous to plant and human health e.g. excess Sodium in water can be fatal for people with cardiac issues while Boron which is good for plants in small amounts could be toxic if the concentration increases slightly. It is very important to know the dosage of each of these elements that is permissible to our systems. Careful analysis of the physical and chemical constituents of groundwater is necessary to determine the quality of the water hence routine chemical and biological analyses are carried out on municipal and industrial water supplies.

Health organizations including World Health Organization (WHO), United States Public Health Services (USPHS) and Nigerian Standard for Drinking Water Quality (NSDWQ) have laid down various guidelines for water quality requirements based on the uses. Table 1 is an excerpt from the water quality standard of the WHO.

Table 1: An excerpt from the water quality standard of the World Health Organization (WHO)

Element/Substance	Symbol/Formula	Normally found in freshwater/surface water/groundwater	Health based guideline by the WHO
Aluminum	Al		0.2mg/l
Ammonia	NH ₄	< 0.2mg/l (up to 0.3mg/l in anaerobic waters)	No guideline
Antimony	Sb	< 4 µg/l	0.005mg/l
Arsenic	As		0.01mg/l
Barium	Ba		0.3mg/l
Beryllium	Be	< 1µg/l	No guideline
Boron	B	< 1mg/l	0.3mg/l
Cadmium	Cd	< 1µg/l	0.003mg/l
Chloride	Cl		250mg/l
Chromium	Cr ³⁺ , Cr ⁶⁺	< 2µg/l	0.05mg/l
Copper	Cu		2mg/l
Cyanide	CN ₋		0.07mg/l
Fluoride	F	< 1.5mg/l (up to 10)	1.5mg/l
Hardness	Mg/l CaCO ₃)		No guideline
Hydrogen sulphide	H ₂ S		No guideline
Iron	Fe	0.5-50mg/l	No guideline
Lead	Pb		0.01mg/l
Manganese	Mn		0.5mg/l
Mercury	Hg	< 0.5µg/l	0.001mg/l
Molybdenum	Mb	< 0.01mg/l	0.07mg/l
Nickel	Ni	< 0.02mg/l	0.02mg/l

Nitrate and nitrite	NO ₃ , NO ₂		50mg/l total nitrogen
Selenium	Se	<< 0.01mg/l	0.01mg/l
Silver	Ag	5-50 µg/l	No guideline
Sodium	Na	< 20mg/l	
Uranium	U		1.4mg/l
Zinc	Zn		3mg/l

II. MATERIALS AND METHOD

1.5. Sampling

For this study, Twenty-five (25) groundwater samples {Nine (9) borehole samples and sixteen (16) samples from hand-dug wells} were collected from the study area and twenty-three physico-chemical parameters including Total dissolved solids (TDS), conductivity, total hardness, pH, colour, alkalinity and turbidity, Nitrate (NO₃²⁻), Phosphate (PO₃²⁻), Sulphate (SO₄²⁻), Fluoride (Fl), Bicarbonate (HCO₃⁻), Calcium (Ca), Magnesium (Mg), Potassium (K), Sodium (Na), Manganese (Mn), Iron (Fe), Copper (Cu), Zinc (Zn), Lead (Pb), Aluminum (Al) and chloride (Cl) were measured to determine the concentration of the various elements present in the water samples. These results were then compared with various standards to determine the portability of the samples. The hand-dug wells differ in character in that some were cased while others were not cased. This may affect the physical and chemical properties of the water in the wells.

A sampling plan that traversed the whole area had been drawn prior to sample collection so that the samples collected will represent all the rock types in the area. All the samples were collected within a two-day period to reduce the effect of temporal variation on the water chemistry. The samples were collected in clean 75cl water containers and well labelled and preserved until they were analyzed. The sampling points were located using Global Positioning System (GPS) equipment and the coordinates are presented in table 2. The samples were designated (B) to indicate samples obtained from machine drilled boreholes and (W) hand dug wells.

Table 2: Sampling Points

Location	Coordinates	Source/Label	Description
1	N 07° 37.097′ E 005° 13.070′	Borehole/B1	Opposite Saint Thomas Aquinas Catholic Primary School, Irona Street.
2	N 07° 39.734′ E 005° 12.549′	Well/W1	The Nigerian Police Force Headquarters, Basiri Street, Iyin Road.
3	N 07° 36.662′ E 005° 13.355′	Well/W2	No 62A, Okebola Street, beside Intercontinental bank plc.
4	N 07° 36.646′ E 005° 13.337′	Well/W3	Okebola Street, Ikere Road
5	N 07° 36.731′ E 005° 13.299′	Borehole/B2	Kay Calax Hotels, Opposite Ade-Tade Hospitals complex.
6	N 07° 35.747′ E 005° 17.548′	Borehole/B3	Lagos female Hall, The Federal polytechnic, Ado-Ekiti
7	N 07° 36.275′ E 005° 17.330′	Well/W4	Annex Male Hall, The Federal Polytechnic, Ado-Ekiti.
8	N 07° 35.835′ E 005° 12.843′	Well/W5	Bamgboye Street, off Ikere road, Ado-Ekiti
9	N 07° 35.816′ E 005° 12.811′	Dam W6	Ureje Waterworks Dam, Ado-Ekiti
10	N 07° 35.388′ E 005° 13.042′	Well/W7	Arowolo Street along Alaafia bakery road, opposite Akure garage
11	N 07° 35.380′ E 005° 12.997′	Borehole/B4	FESTMAG Hotels, Alaafia street
12	N 07° 35.337′ E 005° 12.999′	Borehole/B5	Behind SMA Motors, Akure Road, Ado-Ekiti.

13	N 07° 35.156′ E 005° 13.224′	Well/W8	NO 5, Olujoda Street, Behind New Coca Cola, Off Ikere Road, Ado-Ekiti
14	N 07° 37.193′ E 005° 13.290′	Well/W9	NO 24, Isato Street, Behind Kings Market
15	N 07° 37.177′ E 005° 13.283′	Well/W10	NO 26, Isato Street, Behind Kings Market
16	N 07° 37.062′ E 005° 13.609′	Well/W11	Alhaji Imoyomi mosque, Ilusunja Street
17	N 07° 36.972′ E 005° 13.756′	Well/W12	Idemo compound, Idemo Street, Polytechnic road
18	N 07° 36.977′ E 005° 13.746′	Well/W13	Behind Idemo Compound, Poly Road
19	N 07° 36.927′ E 005° 13.780′	Borehole/B6	Poly Road, Ado-Ekiti
20	N 07° 37.308′ E 005° 13.535′	Well/W14	Mary Immaculate girl's grammar school, old garage, Ado-Ekiti
21	N 07° 38.225′ E 005° 13.839′	Borehole/B7	NO 169, Dayo Fajuru Road, Housing Estate Road, Oke-Ila, Ado-Ekiti
22	N 07° 38.205′ E 005° 13.834′	Borehole/B8	Oke Ila Street, Ado-Ekiti
23	N 07° 39.482′ E 005° 13.906′	Well/W15	145, Opopogbooro Street, opposite Dave Hotel, University Road, Ado- Ekiti
24	N 07° 39.436′ E 005° 13.949′	Borehole/B9	M.R.S. Filling Station, beside Dave Hotel, University Road, Ado- Ekiti
25	N 07° 39.390′ E 005° 13.642′	Well/W16	NOVA Road, Adebayo Street, Ado-Ekiti

1.6. Physical analysis

1.6.1. pH determination

pH is the measure of the degree of acidity or alkalinity of water in which pure water has a pH value of 7. Values greater than 7 indicate alkalinity while values lower than 7 indicate acidity. It is mathematically defined as the negative logarithm of the hydrogen ion concentration. For accuracy, the pH meter was standardized with buffers of 7.00 and 4.00 pH values before the probe was inserted into the samples and the values read off the meter.

1.6.2. Determination of Total Dissolved Solids (TDS)

Total dissolved solids (TDS) is the concentration of dissolved substances (mostly salts) in water. This analysis was carried out using a conductivity meter

1.6.3. Determination of conductivity

Conductivity is defined as the estimate of a material's ability to conduct electric current. This is made possible by the presence of ions of some salts in water. The volume of electricity that can be conducted depends on the concentration of the ions

1.6.4. Determination of Total Hardness

Presence of calcium and magnesium salts determines to a large extent the hardness of natural waters while the concentration of iron, aluminum and other metals in the water contributes a small measure to its hardness. Temporary hardness which results from the bicarbonates and carbonates of calcium and magnesium can be removed by boiling of the water. The higher the concentration of these salts, the harder it is said to be. For this research, separate analyses was done to determine the concentration of calcium and magnesium salts in the samples. The two values were then added together to determine the hardness.

Total Hardness = Ca^{2+} (ppm) hardness + Mg^{2+} (ppm) hardness

These analyses were carried out at the Central Laboratory of Obafemi Awolowo University, Ile-Ife.

1.6.5. Cations determination

These analyses were carried out using the Buck 205 Scientific Atomic Absorption Spectrophotometer which was developed at the division of chemical physics of the commonwealth Scientific and Industrial Research Organization (CISPRO), Australia by Walsh

(SpectrochemicaActa, 1995). The equipment was designed to measure the concentration of metals in solution such as water, soil, blood, serum etc. It provides integrated measurements in absorbance or emission intensity as well as sample concentration in comparison to standard solutions.

The sample solution is aspirated into a flame and the sample element is converted into atomic vapour. The flame therefore contains some of the atoms of the elements of interest. Some of these atoms become thermally excited and absorb the radiation given off by the hollow cathode lamp which consists of a cylindrical hollow cathode made of the element to be determined or an alloy of it. The radiation goes into a monochromator where the particular resonance line required is isolated and any absorption off the resonance line due to the atomic vapor in the flame is measured by means of a photomultiplier. Apart from the sulphate, nitrate, phosphate and chloride analyses which were carried out at the Centre for Energy Research and Development (CERD), Obafemi Awolowo University, Ile-Ife, other analyses were done at the International Institute for Tropical Agriculture (IITA), Ibadan, Oyo State.

III. RESULTS AND DISCUSSIONS

1.7. Physical parameters

The physical parameters determined include pH, conductivity, TDS, turbidity and total hardness.

For this study, the pH values ranged from 5.04 to 7.47 (Well samples) and from 4.39 to 7.54 (Borehole samples). A mean value of 6.51 ± 0.72 (Well) and 6.27 ± 1.04 (Borehole) indicates an almost neutral (weakly acidic) to slightly basic nature of the samples. These values fall within the (WHO, 1971, 1993) maximum permissible range of 6.5 to 9.2 and within the acceptable limit of drinking water supply of USEPA (1976) which is 5.0 to 9.0.

The total hardness (TD) values for well samples ranged from 8.56 to 20.37mg/l with a mean of 14.85 ± 4.24 and from 9.40 to 17.2mg/l for borehole water samples with a mean of 13.29 ± 2.72 . All these values fall way below the maximum acceptable level of 500mg/l recommended by WHO (1971) for drinking water. On the basis of these values, the water samples can be described as soft following Sawyer and McCarty's (1967) classification of water.

Conductivity is a measure of the conducting ionic species in a sample solution. It had a range of values between 180 to 2012 μ S/cm and a mean of 709.82 ± 616.71 μ S/cm for the well samples, while the borehole samples had a range of 212 to 851 μ S/cm and a mean of 336.13 ± 212.4 μ S/cm. the mean conductivity of both sample types exceeds the permissible level of 250 μ S/cm recommended by WHO (1971) for drinking water although no health implication was given for this anomaly.

Alkalinity values ranged from 0.016-0.037mg/l and 0.016-0.039mg/l for well and borehole samples respectively. Calculated means had values of 0.022 ± 0.0059 mg/l and 0.0228 ± 0.008 mg/l for well and borehole samples respectively.

Total dissolved solids (TDS) values ranged from 91-1000mg/l and 107-429mg/l for well and borehole water samples respectively. The calculated means were 357.118 ± 306.17 mg/l and 170.125 ± 106.5 mg/l respectively. These values are below the permissible standards recommended by both WHO (1971) and NSDWQ (2007). When considered individually, some of the wells had TDS values greater than the 500mg/l limit recommended by NSDWQ (2007) as shown on table 7. A comparison of some selected physic-chemical parameters in both well and borehole samples are shown in Figure 2.

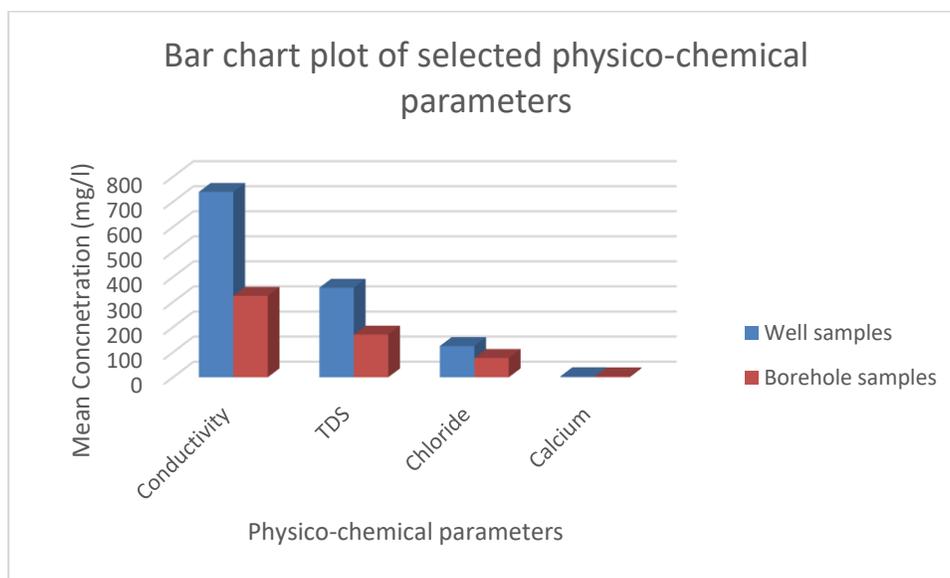


Figure 2: Bar chart plot of selected physico-chemical parameters

1.8. Chemical parameters

1.8.1. Cations

1.8.1.1. Calcium Ion

Calcium is the most abundant cation in the samples with values ranging from 2.191-6.151 mg/l and 3.051 - 6.151 mg/l for well and borehole samples respectively. The means are 4.318 ± 1.36 mg/l and 4.14 ± 0.98 mg/l respectively. These mean values fall below the maximum permissible limit of 250mg/l recommended by the WHO (1971).

1.8.1.2. Magnesium ion

Analysis revealed concentration values within the range of 0.751-1.956 mg/l and 0.432-1.751 for well and borehole water samples respectively. The calculated means are 1.095 ± 0.29 mg/l and 0.967 ± 0.34 mg/l for well and borehole water samples. These values although below the WHO (1971) specified permissible limit if 100mg/l, they exceed the maximum permitted concentration values recommended by the NSDWQ (2007) of 0.2mg/l although no specific health hazards from excess intake of magnesium were specified.

1.8.1.3. Potassium ion

Potassium concentration ranges from 0.139-0.418 mg/l and 0.116-0.401 for well and borehole samples respectively. The mean concentrations are 0.31 ± 0.09 mg/l and 0.266 ± 0.09 mg/l respectively. None of the standards used for this study specify a permissible limit for potassium concentration. Salts of potassium form electrolytes which assist the kidneys in regulating fluid levels and the balance of acids and bases in the body.

1.8.1.4. Sodium ion

The concentration of sodium in the groundwater samples range from 0.079-0.126mg/l and 0.113-0.141 mg/l with means of 0.11 ± 0.028 mg/l and 0.109 ± 0.020 mg/l for well and borehole water samples respectively. These means fall below the permissible limits of 250mg/l recommended by WHO (1971) and NSDWQ (2007). Sodium chloride also helps regulate fluid levels and the balance of acids and bases.

1.8.1.5. Iron ion

At certain concentrations is water, iron causes coloration, taste and encourages bacterial growth. It also causes scaling in pipes, stains clothing and cooking utensils (Ezeigbo, 1988). For this study, the iron concentration range from 0.008-0.071 mg/l and 0.009-0.081 mg/l for well and borehole samples respectively. Mean values of 0.037 ± 0.021 mg/l and 0.032 ± 0.025 mg/l were derived for well and borehole samples respectively. These values fall below the maximum permissible limit of 1.0 mg/l recommended by WHO (1971) and also fall below the 0.3 mg/l mark given by the NSDWQ (2007).

1.8.1.6. Mean concentration of cations.

To determine the order of dominance of the various ions present in the samples, the mean (average) concentrations of the five cations tested for were plotted on a bar chart. The order was found to be $Ca^{2+} > Mg^{2+} > K^+ > Na^+ > Fe^{2+}$. This order generally agree with the empirical pattern of mobility in secondary environment in natural water (Krauskopf, 1967).

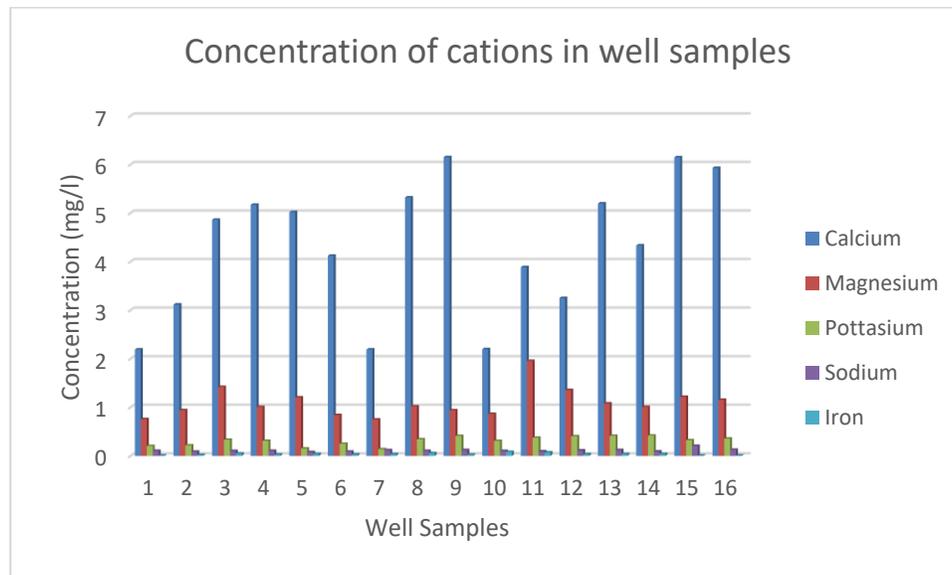


Figure 3: Concentration of cations in well samples

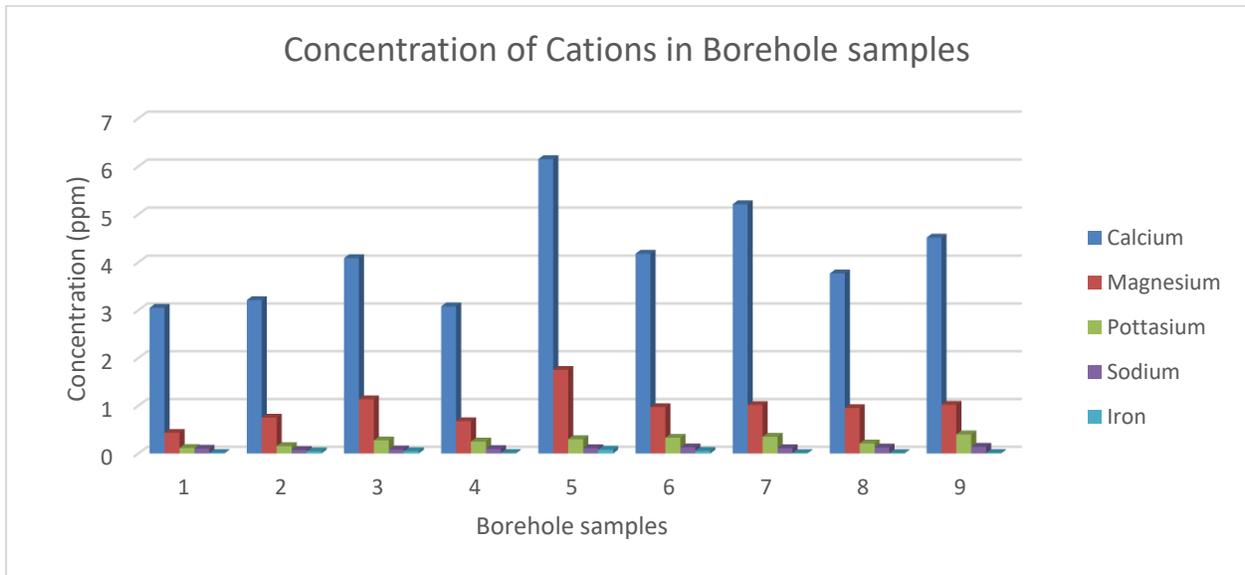


Figure 4: Concentration of cations in Borehole samples

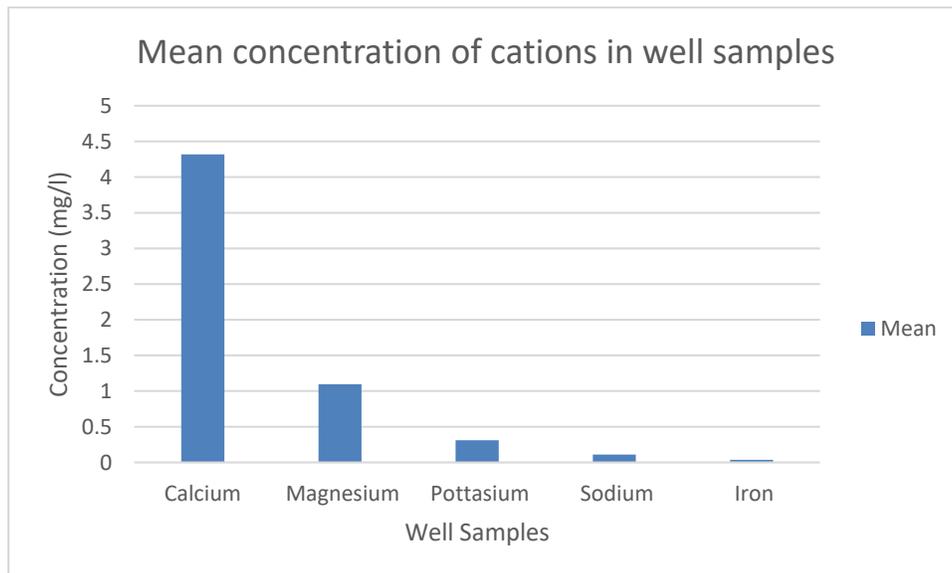


Figure 5: Mean concentration of cations in well samples

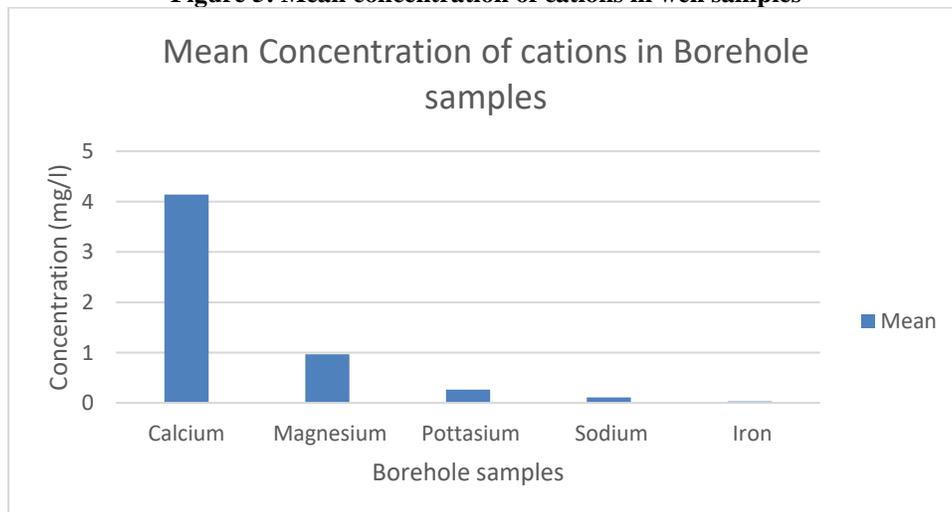


Figure 6: Mean concentration of anions in borehole samples

1.8.2. Anions

1.8.2.1. Sulphate ion

For this study, the concentration of sulphate ion ranged from 58.21-186.62 mg/l and 46.91-133.01 mg/l for well and borehole samples respectively. The mean values were 124.567 ± 40.85 mg/l and 95.475 ± 30.64 mg/l for well and borehole samples. These values fall below the permissible limit of the WHO (1971) but exceed the 10mg/l limit recommended by USEPA (1976) for domestic water supply. The mean values obtained for the well samples also exceed the limit recommended by the NSDWQ (2007).

1.8.2.2. Phosphate ion

Phosphate occurs in water as compounds. Its concentration in the well samples ranged from 1.663-5.332 mg/l and 1.34-3.743 for the borehole samples. The mean values obtained are 3.559 ± 1.17 mg/l and 2.728 ± 0.88 mg/l for well and borehole samples respectively. There are no specified limits for phosphate concentration.

1.8.2.3. Nitrate ion

Nitrate concentration in the groundwater samples analyzed fall within the range of 11.6-61.623 mg/l for well samples and 10.291-32.538 mg/l for borehole samples. The means are 32.98 ± 16.68 mg/l and 21.907 ± 7.97 mg/l respectively. These means fall below the 50mg/l WHO (1993) and NSDWQ (2007) limits. Nitrate in concentrations greater than 50ppm is undesirable in water used for domestic purposes as it can cause asphyxia (blue-baby syndrome) and cyanosis in infants under three months old. Hence, samples W5, W6, W11, W12 and W13 with nitrate concentrations greater than 50mg/l should be treated before use.

1.8.2.4. Chloride ion

Hall and Chapman (1997) posits that water containing less than 150mg/l of chloride is satisfactory for most purposes. For this study, the concentration of chloride in the well water samples range from 65.109-260.834 mg/l with a mean values of 124.613 ± 70.65 mg/l while the range for borehole samples is 61.101-88.902 mg/l with a mean of 77.1 ± 8.77 mg/l. These means fall below the highest desirable level and the maximum permissible range of 200mg/l and 600mg/l respectively recommended by the WHO (1971). They are also acceptable by USEPA (1976) and NSDWQ (2007).

1.8.2.5. Fluoride ion

Fluoride concentration ranged from 0.049-0.072 mg/l for well water samples with a mean of 0.062 ± 0.01 mg/l. For borehole samples, the concentration ranged from 0.003-0.081 mg/l with a mean of 0.042 ± 0.03 mg/l. These means fall below the permissible limit of 1.5mg/l recommended by WHO (1971) and NSDWQ (2007).

1.8.2.6. Bicarbonate ion

The concentration of bicarbonate ion in the samples obtained from hand-dug wells ranged from 0.003-0.009 mg/l with a mean value of 0.006 ± 0.002 mg/l while that of borehole samples ranged from 0.001-0.009 mg/l with a mean of 0.006 ± 0.003 mg/l. no recommended limit was given by WHO and other standards used for this study.

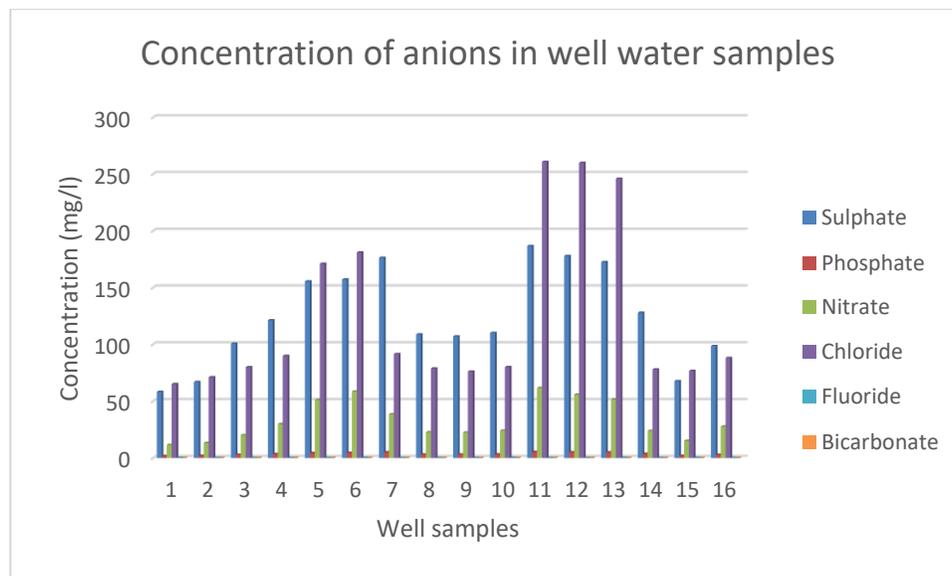


Figure 7: Concentration of anions in well water samples

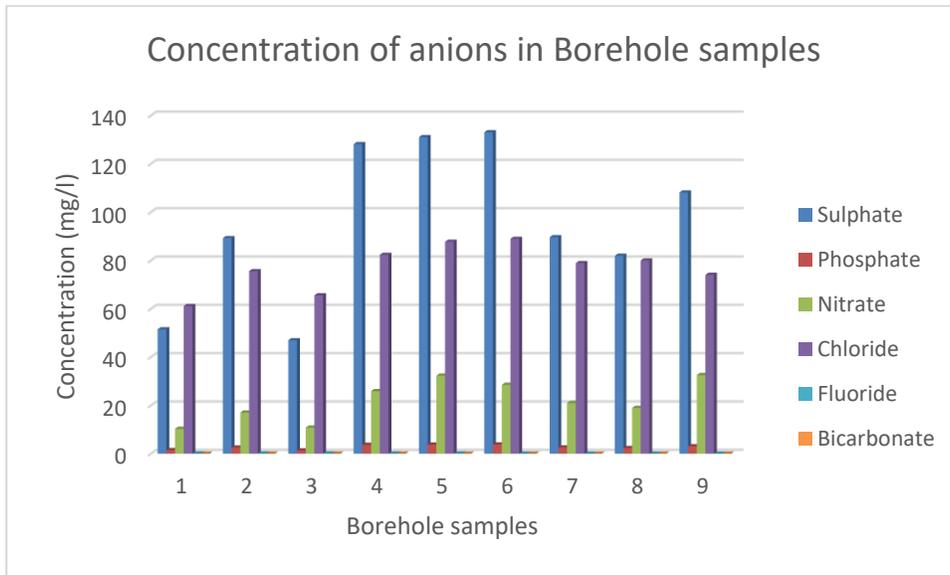


Figure 8: Concentration of anions in Borehole samples

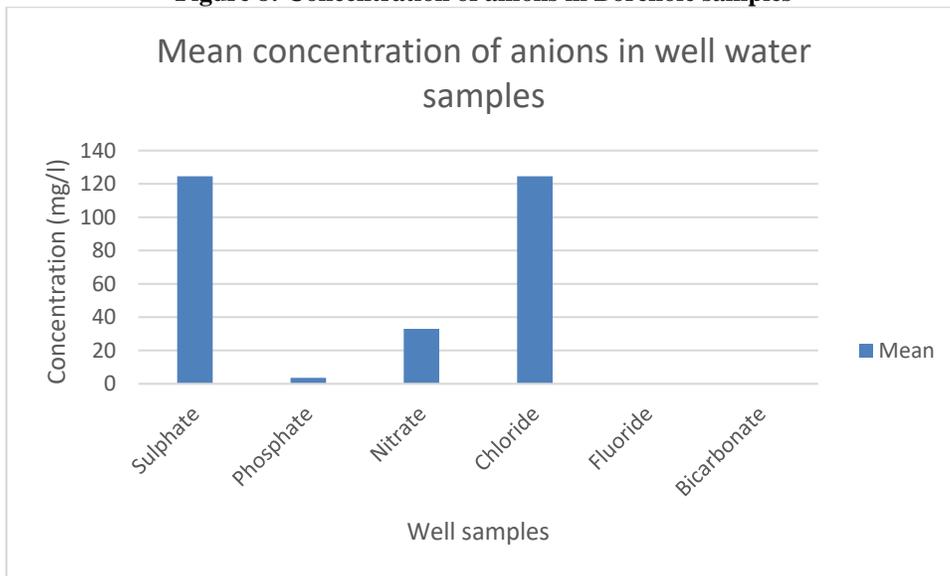


Figure 9: Mean concentration of anions in well water samples

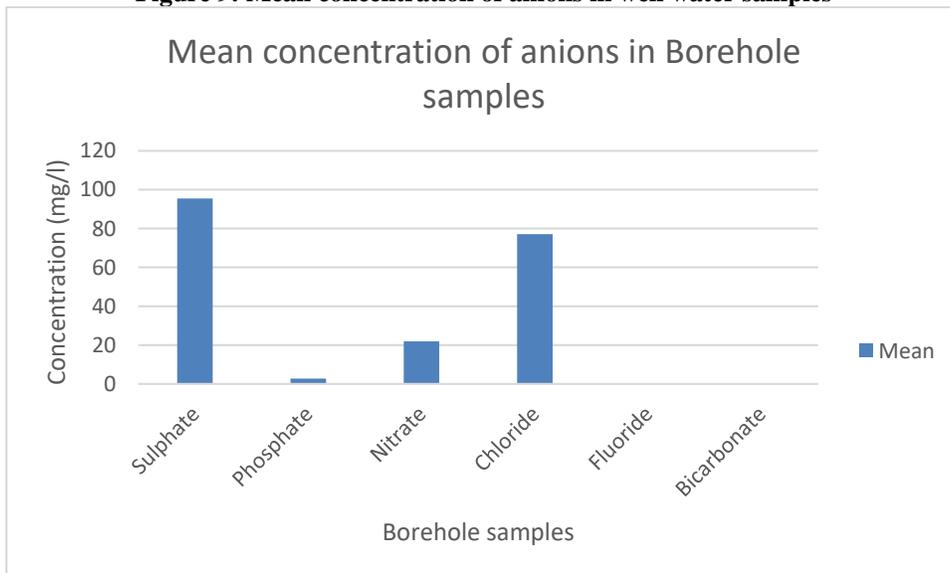


Figure 10: Mean concentration of anions in Borehole samples

1.8.3. Trace elements

1.8.3.1. Copper

The detected range of copper concentration in the study area was 0.006-0.016 mg/l and 0.005-0.013 mg/l for well and borehole water samples respectively. The means were 0.011 ± 0.003 mg/l and 0.009 ± 0.002 mg/l respectively. These values fall well below the permissible limits recommended by WHO (1971), USEPA (1976) and NSDWQ (2007).

1.8.3.2. Zinc

The concentration of Zinc ranged from 0.011-0.041 mg/l and 0.011-0.061 mg/l with means of 0.023 ± 0.011 mg/l and 0.026 ± 0.019 mg/l for well and borehole samples respectively.

They also fall below the permissible limits of the standards used.

1.8.3.3. Lead

For well and borehole samples respectively, lead had a range of concentration of 0.001-0.005mg/l with a mean value of 0.003 ± 0.001 mg/l and 0.002-0.005mg/l with a mean of 0.003 ± 0.001 mg/l all within the acceptable limits recommended by WHO (1971) and NSDWQ (2007).

1.8.3.4. Aluminum

Concentration values for Aluminum fall within the range of 0-0.004mg/l for well samples with a calculated mean of 0.001 ± 0.001 mg/l while the borehole samples had a range of 0.001-0.003mg/l with a mean of 0.002 ± 0.001 mg/l. These means fall below the permissible limits recommended by WHO (1971) and NSDWQ (2007).

1.8.3.5. Manganese

These had values between 0.031-0.102mg/l with a mean of 0.054 ± 0.017 mg/l and 0.026-0.073mg/l and a mean of 0.051 ± 0.016 mg/l for well and borehole water samples respectively. They fall within the acceptable limits of the WHO (1971) and NSDWQ (2007) although the mean of the well water samples exceed the 0.05mg/l limit recommended by USEPA (1976) for domestic water use.

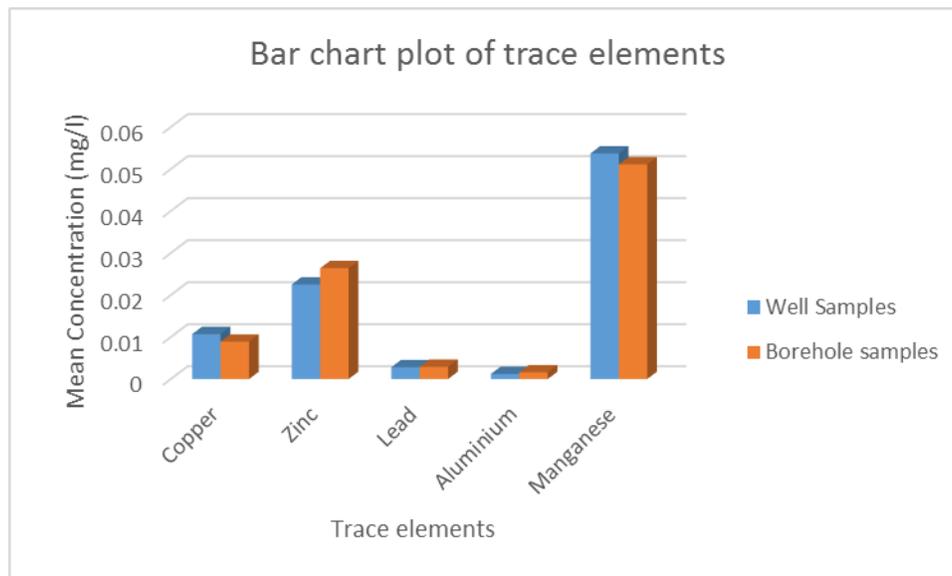


Figure 11: Bar chart plot of trace elements

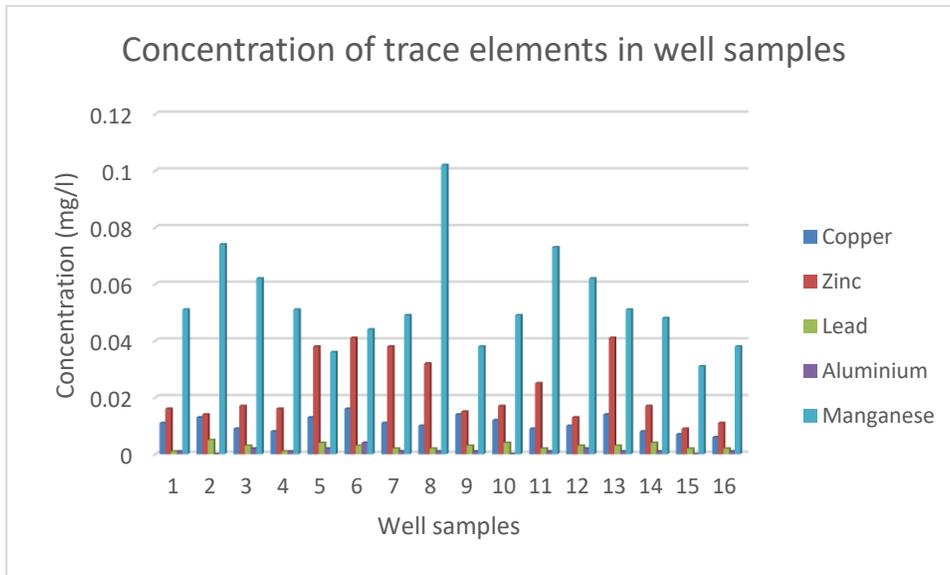


Figure 12: Concentration of trace elements in well samples

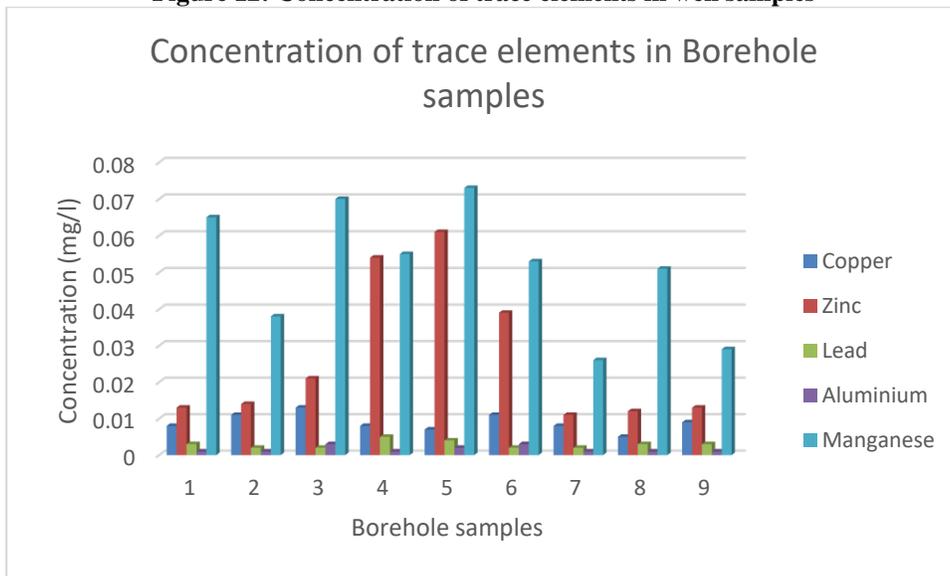


Figure 13: Concentration of trace elements in Borehole samples

1.8.3.6. Mean concentration of trace elements

To determine the order of dominance of the trace elements, the mean concentration was plotted on a bar chart. The order was Mn>Zn>Cu>Pb>Al and it is similar for both well and borehole water samples.

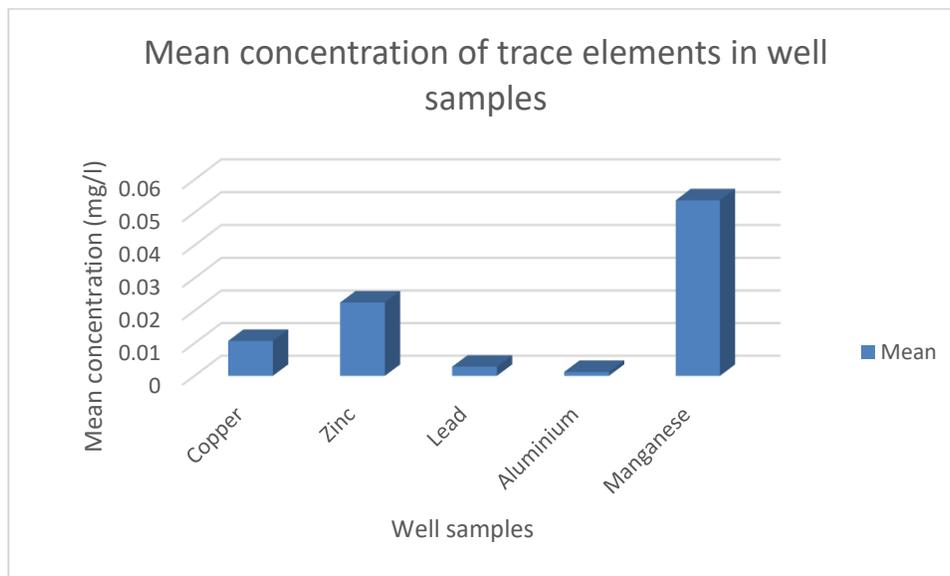


Figure 14: Mean concentration of trace elements in well samples

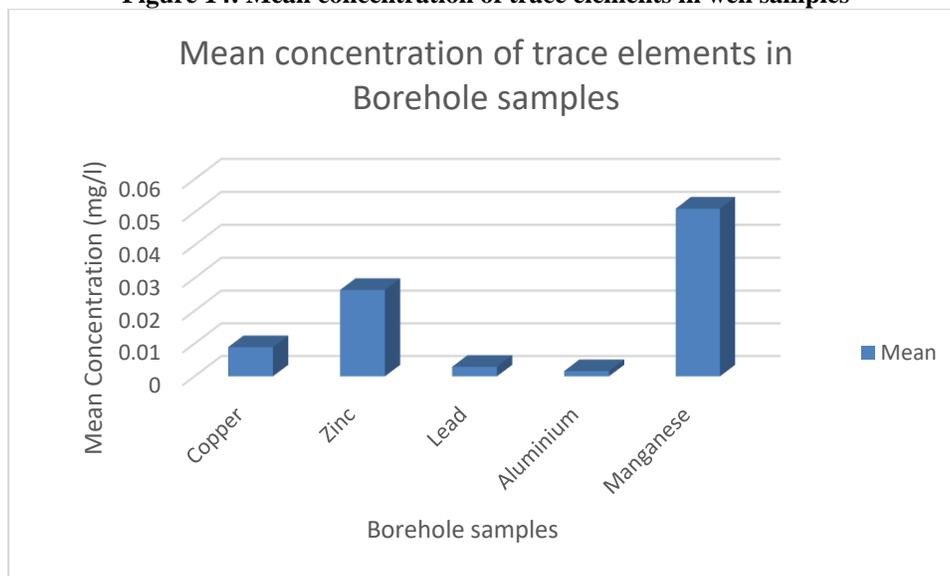


Figure 15: Mean concentration of trace elements in Borehole samples

Table 3: Comparison of results with WHO (1971, 1993) guidelines for drinking water

WHO DRINKING STANDARDS			THIS STUDY			
PARAMETERS	HIGHEST DESIRABLE LEVEL	MAXIMUM PERMISSIBLE RANGE	WELLS (N=16)		BOREHOLES (N=9)	
			RANGE	MEAN	RANGE	MEAN
PH	7-8	6.5-9.2	5.04-7.47	6.51±0.72	4.39-7.54	6.27±1.04
Conductivity (µS/cm)	-	250*	180-2012	709.82±616.71	212-851	336.13±212.4
Turbidity (NTU)	5	25				
Total hard. (mg/l)	150-500*		8.56-20.37	14.85±4.24	9.40-17.2	13.29±2.72
Calcium (mg/l)	75	200	2.19-6.151	4.32±1.35	3.051-6.151	4.14±0.98

Magnesium(mg/l)	30	100	0.751-1.956	1.095±0.29 2	0.432- 1.751	0.97±0.344
Potassium(mg/l)			0.139-0.418	0.31±0.089	0.116- 0.401	0.27±0.087
Sodium(mg/l)		200	0.079-0.207	0.11±0.029	0.075- 0.141	0.11±0.02
Manganese(mg/l)		0.5	0.031-0.10	0.054±0.01 7	0.026- 0.073	0.051±0.01 6
Iron(mg/l)	0.3	1.0	0.008-0.083	0.037±0.02 1	0.009- 0.081	0.03±0.025
Copper(mg/l)		2	0.006-0.016	0.011±0.00 3	0.005- 0.013	0.009±0.00 2
Zinc(mg/l)		3	0.009-0.041	0.023±0.01 1	0.011- 0.061	0.026±0.01 9
Lead(mg/l)		0.01	0.001-0.005	0.003±0.00 1	0.002- 0.005	0.003±0.00 1
Fluoride(mg/l)		1.5	0.049-0.072	0.06±0.001	0.003- 0.081	0.042±0.03
Bicarbonate(mg/l)			0.003-0.009	0.001±0.00 2	0.001- 0.009	0.006±0.03
Total dissolved solids (mg/l)	500	1500	91-1000	357.12±306 .17	107-429	170.125±1 06.5
Chloride(mg/l)	200	600	65.11-260.83	124.61±70. 65	61.1- 88.902	77.1±8.77
Nitrate(mg/l)		50*	11.6-61.62	32.98±16.6 8	10.29- 32.538	21.91±7.97
Phosphate(mg/l)			1.66-5.33	3.56±1.17	1.34-3.8	2.73±0.88
Sulphate(mg/l)	200	500*	58.21-186.62	124.57±40. 85	46.91- 133.01	95.48±30.6 4
Alkalinity(mg/l)		0.2	0.016-0.037	0.022±0.00 59	0.016- 0.039	0.0228±0.0 08
Aluminum(mg/l)			0.0-0.004	0.001±0.00 01	0.001- 0.003	0.002±0.00 1

Table 4: Comparison of results with groundwater samples from Modakeke/Ile-Ife, Osun State (Ako et al, 1990)

Parameters	Modakeke/Ile-Ife (n=50)		This Study			
			Wells (n=16)		Boreholes (n=9)	
	Range	Mean±SD	Range	Mean±SD	Range	Mean±SD
TDS	1.26- 7660	1.3±186	91-1000	357.118±306.17	107-429	170.125±106.5
PH	5.80-8.4	6.89±10.0	5.04-7.47	6.514±0.72	4.39-7.54	6.269±1.04
Conductivity	39-1990	511.2±62.2	180-2012	709.83±616.71	212-851	336.13±212.4
Total hardness	6.4- 286.5	98.7±10.4	8.564- 20.368	14.85±4.24	9.397- 17.196	13.291±2.72
Ca ²⁺	0.83- 12.8	30.27±3.75	2.19- 6.151	4.32±1.35	3.051- 6.151	4.14±0.98
Mg ²⁺	0.00- 34.45	5.65±0.89	0.751- 1.956	1.095±0.292	0.432- 1.751	0.97±0.344
Fe ²⁺	0.00- 6.22	0.41±0.13	0.008- 0.083	0.037±0.021	0.009- 0.081	0.03±0.025
Na ⁺	0.83- 86.21	21.61±2.89	0.079- 0.207	0.11±0.029	0.075- 0.141	0.11±0.02
K ⁺	1.35- 143.83	35.89±4.76	0.139- 0.418	0.31±0.089	0.116- 0.401	0.27±0.087
SO ₄ ²⁻	39.4- 170.3	30.94±4.46	58.21- 186.62	124.57±40.85	46.91- 133.01	95.48±30.64

HCO ₃ ⁻	5.50-239	106.1±17.95	0.003-0.009	0.001±0.002	0.001-0.009	0.006±0.03
Cl ⁻	0.00-10.6	1.89±0.80	65.11-260.83	124.61±70.65	61.1-88.902	77.1±8.77
NO ₃ ⁻	0.00-14.25	4.55±0.79	11.6-61.62	32.98±16.68	10.29-32.538	21.91±7.97
F ⁻	-	-	0.049-0.072	0.06±0.001	0.003-0.081	0.042±0.03
PO ₄ ³⁻	0.0-0.61	0.06±0.02	1.66-5.33	3.56±1.17	1.34-3.8	2.73±0.88

Table 5: Comparison of results with USEPA (1976) standards

USEPA Standards		This Study	
CONSTITUENT	Domestic water supply	Wells (n=17)	Boreholes (n=8)
pH	5.0-9.0	5.04-7.47	4.39-7.54
Hardness (mg/l)	-	8.564-20.368	9.397-17.196
Chloride (mg/l)	250	65.109-260.834	61.101-88.902
Sulphate (mg/l)	10	58.21-186.621	46.911-133.009
Copper (mg/l)	1	0.006-0.016	0.005-0.013
Iron (mg/l)	0.3	0.008-0.083	0.009-0.056
Lead (mg/l)	0.05	0.001-0.005	0.002-0.005
Manganese (mg/l)	0.05	0.031-0.102	0.026-0.073

Table 6: Comparison of results with hardness classification of water (After Sawyer and McCarty, 1967)

Hardness (mg/l)	Water classification	This study	
		wells	boreholes
0-75	Soft	8.564-20.368	9.397-17.196
75-150	Moderate		

150-300	Hard		
>300	Very hard		

Table 7: Comparison of results with NSDWQ (2007) standards

NSDWQ Standards			This study	
Parameter	Maximum permitted	Health impact	Wells (n=17)	Boreholes (n=8)
pH	6.5-8.5		5.04-7.47	4.39-7.54
Hardness (as CaCO ₃) (mg/l)	150		8.564-20.368	9.397-17.196
Chloride (mg/l)	250		65.109-260.834	61.101-88.902
Conductivity (µs/m)	1000		180-2012	212-851
Copper (mg/l)	1	Gastrointestinal disorder	0.006-0.016	0.005-0.013
Fluoride (mg/l)	1.5	Fluorosis, skeletal tissue (bones and teeth) morbidity	0.049-0.077	0.049-0.081
Iron (mg/l)	0.3		0.008-0.083	0.009-0.056
Lead (mg/l)	0.01	Cancer, interference with vitamin D metabolism, affect mental development in infants	0.001-0.005	0.002-0.005
Magnesium (mg/l)	0.20	Consumer acceptability	0.751-1.956	0.432-1.136
Manganese (mg/l)	0.2	Neurological disorder	0.031-0.102	0.026-0.07
Aluminium (mg/l)	0.2	Potential neuro-degenerative disorders	0.0-0.004	0.001-0.003
Nitrate (mg/l)	50	Cyanosis and asphyxia (blue-baby syndrome) in infants under 3months	11.6-61.623	10.291-32.538
Sodium (mg/l)	200		0.079-0.122	0.075-0.141
Sulphate (mg/l)	100		58.21-186.621	46.911-133.009
TDS (mg/l)	500		91-1000	107-429
Zinc (mg/l)	3		0.009-0.061	0.011-0.054

1.9. Comparison of means

To determine if the difference between the calculated means for the well and borehole samples was statistically significant, the T-test was adopted and the values calculated using the relation:

$$T = \frac{x_1 - x_2}{Sp \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,

T = T calculated

X = Mean

$$Sp^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

S² = Variance

V = degree of freedom (V = n₁ + n₂ - 2)

n = number of samples

All T values obtained were tested for at a significance level of 5% (95% confidence level) Results are shown in Table 8.

Table 8: Comparison of chemical quality of well and borehole water samples in Ado-Ekiti using T-test (at 5% significance level)

Parameter	Wells (n=16)	Boreholes (n=9)	t_c	t_t	Remarks
pH	6.514±0.72	6.269±1.04	0.69	2.07	Insignificant
Conductivity	709.824±616.71	336.125±212.4	1.65	2.07	Insignificant
Turbidity	0.01± 0.0019	0.024± 0.03	1.97	2.07	Insignificant
Alkalinity	0.022± 0.0059	0.023 ±0.008	0.72	2.07	Insignificant
Bicarbonate	0.0057± 0.0019	0.0053 ±0.003	0.41	2.07	Insignificant
TDS	357.118±306.17	170.125±106.5	1.62	2.07	Insignificant
Total Hardness	14.847± 4.24	13.291± 2.72	0.94	2.07	Insignificant
Chloride	122.419 ±71.17	75.78± 8.98	1.80	2.07	Insignificant
Sulphate	124.946± 40.88	91.033 ±31.69	2.06	2.07	Insignificant
Phosphate	3.57 ±1.17	2.601± 0.91	2.05	2.07	Insignificant
Nitrate	32.939± 16.68	20.611± 8.03	1.97	2.07	Insignificant
Calcium	4.426 ±1.42	3.889± 0.76	0.99	2.07	Insignificant
Magnesium	1.134 ±0.33	0.87± 0.23	1.99	2.07	Insignificant
Iron	0.0394± 0.023	0.026± 0.02	1.42	2.07	Insignificant
Potassium	0.309 ±0.089	0.261± 0.1	1.2	2.07	Insignificant
Sodium	0.110 ±0.028	0.109± 0.02	0.09	2.07	Insignificant
Fluoride	0.063 ±0.0087	0.066 ±0.01	0.8	2.07	Insignificant
Manganese	0.0548 ±0.018	0.048± 0.02	0.83	2.07	Insignificant
Copper	0.0105± 0.0029	0.009± 0.002	1.3	2.07	Insignificant
Zinc	0.0248± 0.015	0.022± 0.016	0.44	2.07	Insignificant
Lead	0.0028 ±0.0011	0.0028± 0.001	0.00	2.07	Insignificant
Aluminium	0.0012±0.00097	0.0015±0.0009	0.74	2.07	Insignificant

1.10. Pearson linear correlation

Some group of elements respond similarly to a given set of environmental conditions. The Pearson linear correlation of elements measures the linear relationship between different pairs of elements. The correlation coefficient, r , ranges from -1 to +1 with +1 indicating perfect positive correlation and -1 representing perfect negative correlation while a zero value indicates that there is no correlation.

This study shows both positive and negative correlations. The correlation coefficient for well samples varied from -0.496 between pH and Alkalinity to +1.00 between TDS and conductivity as shown on Table X. For the borehole samples, ‘ r ’ ranged from 0.935 between pH and Alkalinity to +1.00 between Sulphate and Phosphate as seen on Figures 20 and 21. The following group of parameters showed strong correlation based on the ‘ r ’ values.

I. Total hardness- Mg^{2+}

Presence of dissolved calcium and magnesium salts is responsible for hardness in waters hence the strong positive correlation between hardness and magnesium in both well and borehole samples. This is shown in the ‘ r ’ values which are 0.898’’ and 0.631’’ for well and borehole waters respectively. Hence an increase in the Mg^{2+} concentration will result in an increase in the hardness of the water.

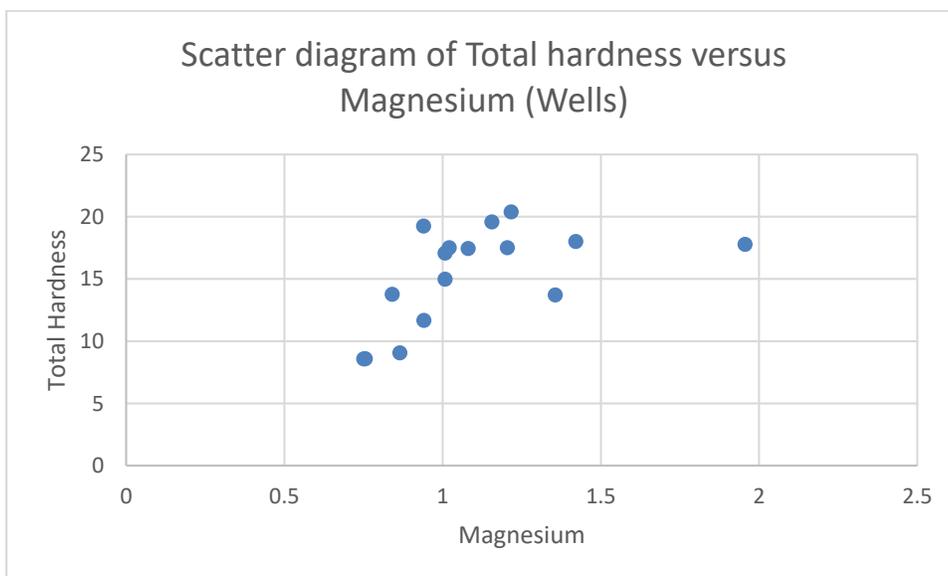


Figure 16: Scatter diagram of Total Hardness versus Magnesium (wells)

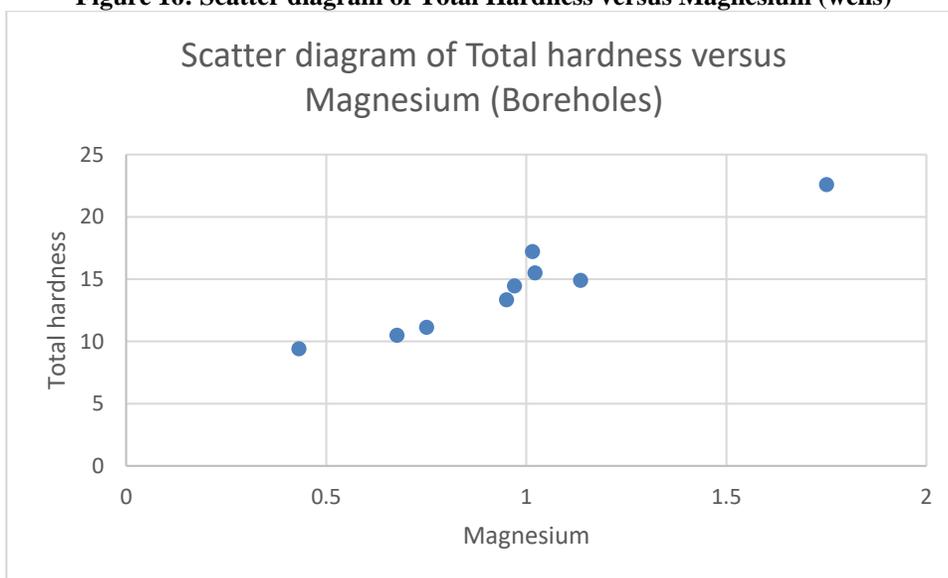


Figure 17: Scatter diagram of Total Hardness versus Magnesium (Boreholes)

II. Conductivity –TDS

The amount of dissolved salts present in water can directly affect its conductivity. This is seen in the strong positive correlation between the two parameters in well and borehole waters. For well water, $r = 1.000''$ indicating perfect positive correlation while $r = 0.999''$ for borehole water.

III. Phosphate-Sulphate

The correlation between phosphate and sulphate gave r values of $1.000''$ in both well and borehole waters. This perfect correlation can be attributed to the fact that their concentrations in the waters are inversely proportional.

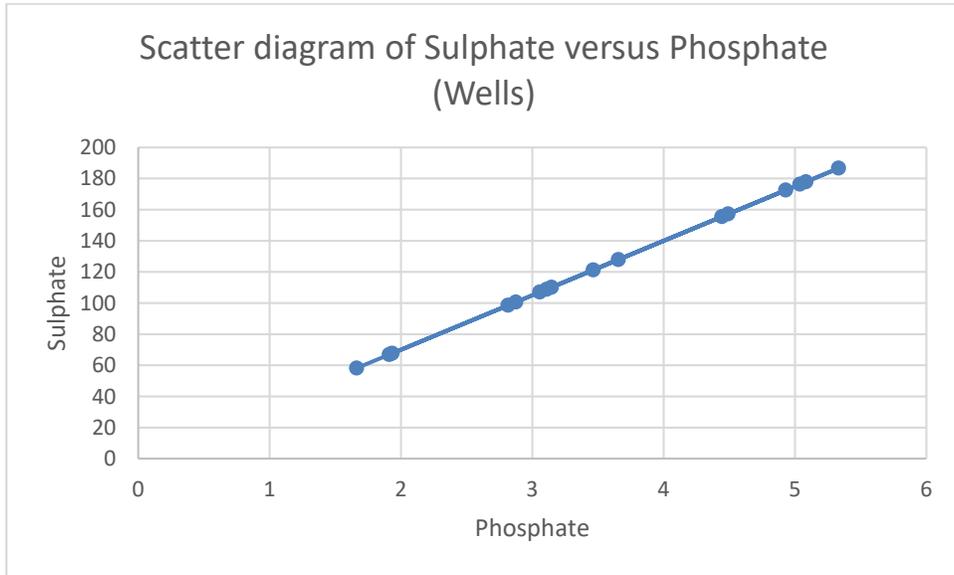


Figure 18: Scatter diagram of Sulphate versus Phosphate (wells)

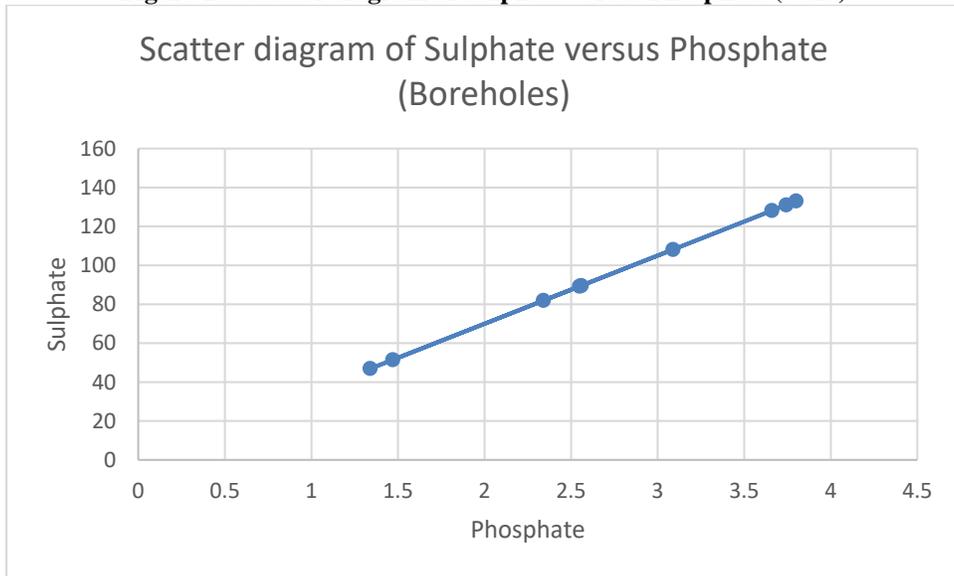


Figure 19: Scatter diagram of Sulphate versus Phosphate (Boreholes)

	PH	Cond.	Alk	Bicarb	TDS	TH	Cl ⁻	SO ₄ ²⁻	NO ₃ ⁻	Ca ²⁺	Mg ²⁺	Fe ²⁺	Na ⁺	Turb	Fl-	PO ₃ ⁴⁻
PH	1															
Cond.	.568'	1														
Alk	-.496'	-.363	1													
Bicarb	.033	-.176	-.245	1												
TDS	.566'	1.000''	-.356	-.181	1											
TH	.104	-.013	.397	.225	-.017	1										
Cl ⁻	.389	.375	-.16	-.059	.369	.079	1									
SO ₄ ²⁻	.314	.268	-.256	.114	.258	.02	.790''	1								
NO ₃ ⁻	.275	.232	-.164	.085	.23	.079	.908''	.920''	1							
Ca ²⁺	.091	-.119	.391	.29	-.122	.954'	-.074	-.102	-.047	1						
Mg ²⁺	.088	.267	.219	-.052	.263	.631'	.433	.323	.368	.369	1					
Fe ²⁺	.148	.379	-.269	-.203	.373	.078	.197	.424	.287	-.094	.483'	1				
Na ⁺	.302	.009	.03	.427	.012	.34	-.173	-.292	-.287	.389	.046	-.356	1			
Turb.	-.447	-.298	.184	.338	-.294	-.07	-.222	-.346	-.285	-.024	-.155	-.185	.253	1		
Fl ⁻	.008	-.179	.015	.039	-.178	.16	-.105	-.308	-.136	.206	-.037	.083	.163	.103	1	
PO ₃ ⁴⁻	.314	.268	-.256	.136	.258	.02	.790''	1.000''	.920''	-.102	.323	.424	-.292	-.308	-.308	1

Figure 20: Correlation results for well samples.

	PH	Cond.	Alk	Bicarb	TDS	TH	Cl ⁻	SO ₄ ²⁻	NO ₃ ⁻	Ca ²⁺	Mg ²⁺	Fe ²⁺	Na ⁺	Turb.	Fl-	PO ₃ ⁴⁻
PH	1															
Cond.	.58	1														
Alk	-.935	-.467	1													
Bicarb	-.005	-.281	-.072	1												
TDS	.553	.999''	-.432	-.28	1											
TH	.654	.225	-.727	.662	.205	1										
Cl ⁻	.720'	.585	-.621	-.458	.563	.273	1									
SO ₄ ²⁻	.529	.547	-.426	-.507	.536	.105	.880''	1								
NO ₃ ⁻	.61	.477	-.547	-.143	.464	.355	.722'	.894''	1							
Ca ²⁺	.55	.188	-.587	.725	.174	.975''	.24	.105	.358	1						
Mg ²⁺	.764'	.265	-.896	.434	.236	.898''	.298	.088	.296	.778'	1					
Fe ²⁺	.143	.56	-.294	-.281	.554	.084	.127	.03	-.122	-.035	.309	1				
Na ⁺	.628	.489	-.466	.319	.485	.491	.388	.412	.672	.529	.339	-.331	1			
Turb.	-.002	-.242	-.003	.487	-	.531	.144	-.006	-.003	.649	.215	-.24	-.01	1		
Fl ⁻	-.234	-.064	.107	.248	-	.115	-.38	-.684	-.786'	.08	.167	.538	-.52	.235	1	
PO ₃ ⁴⁻	.529	.547	-.426	-.507	.536	.105	.880''	1.00''	.894''	.105	.088	.03	.412	-.006	-.682	1

Figure 21: Correlation results for borehole samples.

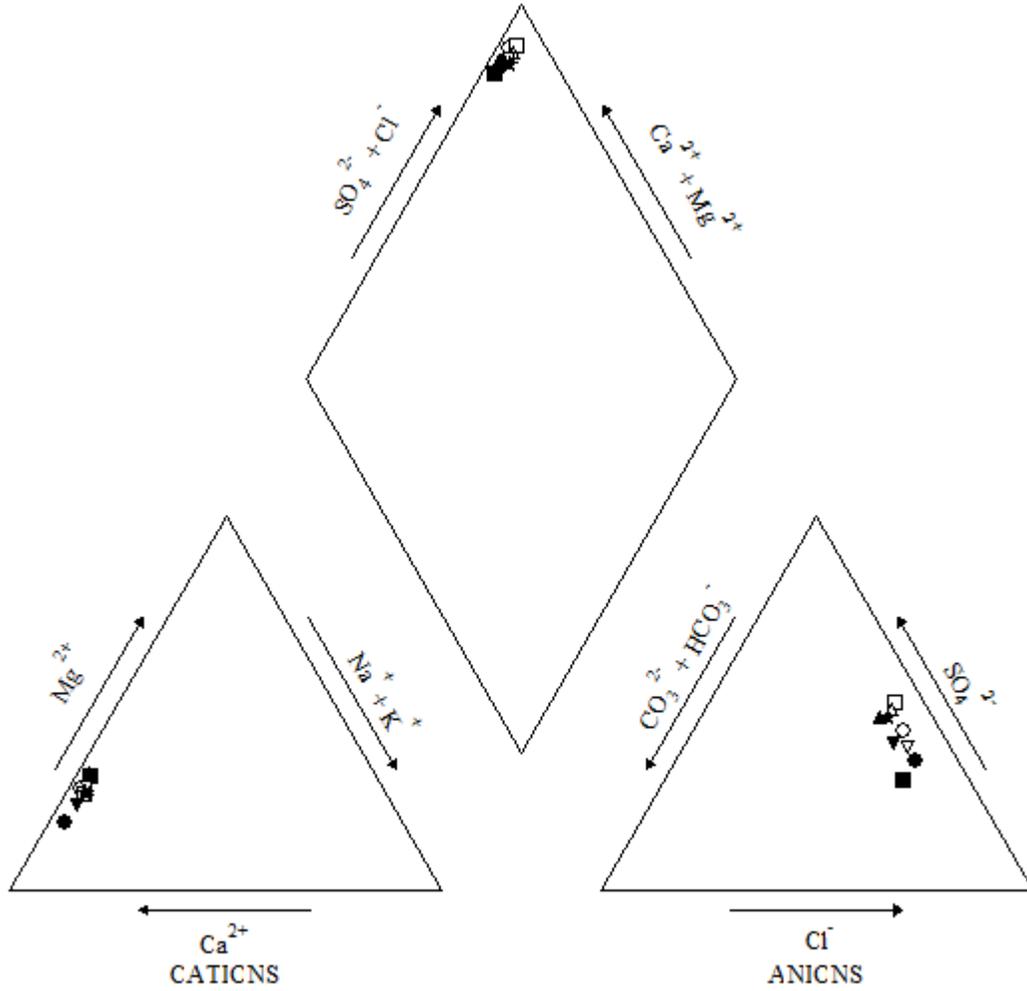


Figure 22: Hydro-geochemical classification of the borehole waters using pier trilinear plot (b1-b9) (Modified from Back, 1966)

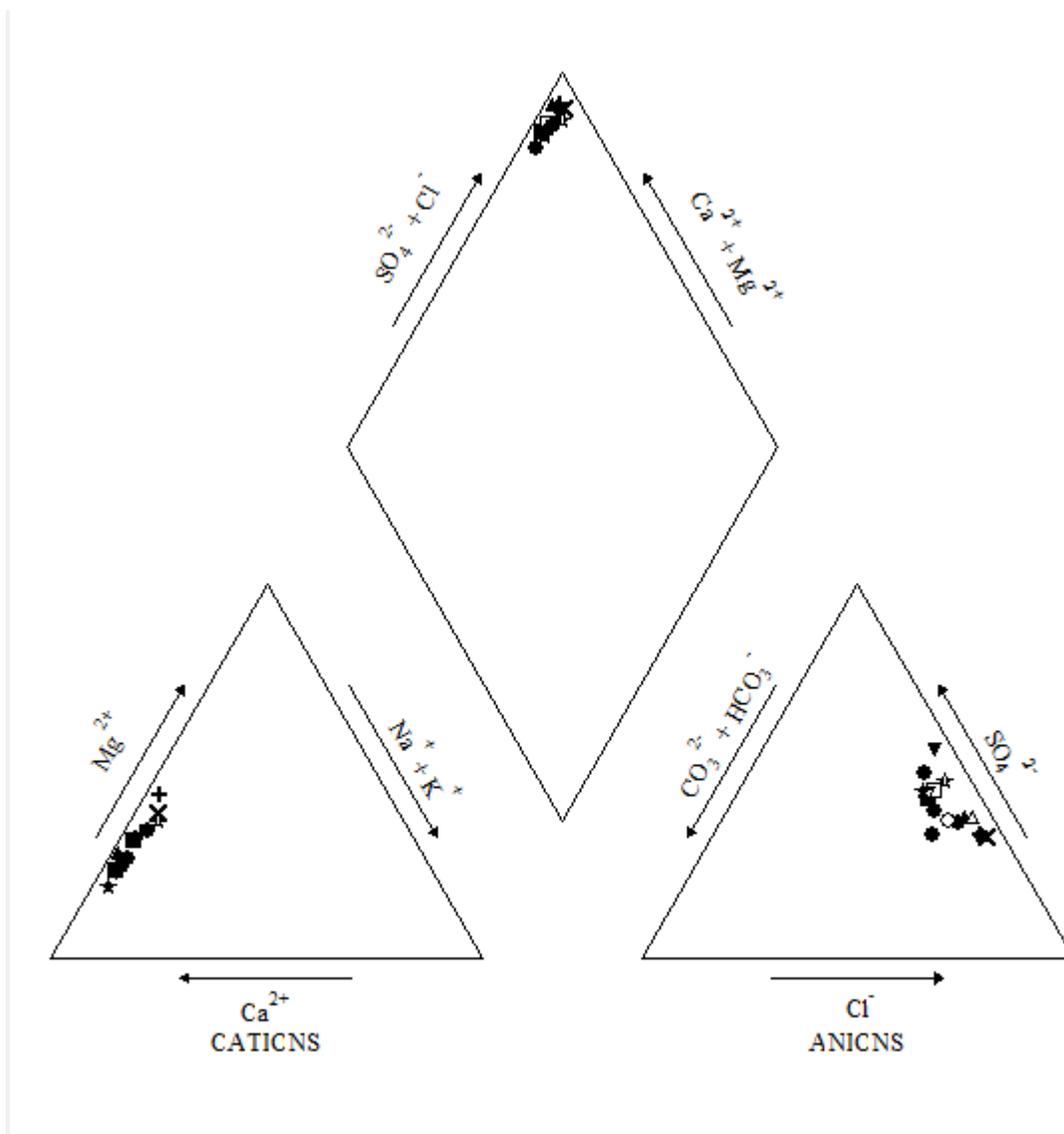


Figure 23: Hydro-geochemical classification of the well waters using piper trilinear plot (w1-w16) (Modified from Back, 1966)

3.5. Mathematical Assessment of the quality of the waters using combined data

To estimate water quality using a comparison of a set of parameters, a standard index which combines nine pollutant parameters namely; Dissolved oxygen (DO), fecal coliforms, pH, Biochemical oxygen demand (BOD), nitrates, phosphates, temperature, turbidity and total solids into one numerical indicator {Water Quality Index (WQI)} was designed by the National Sanitation Foundation (NSF) (Ott, 1978).

The computer application used for the computation of WQI for this study allowed for the use of five pollutant parameters since fecal coliforms, BOD and Dissolved Oxygen were not determined. The WQI for both well and borehole samples are shown in Table 9

Table 9: Water Quality Index for both well and borehole samples

Sample code	WQI values
W1	57
W2	51
W3	49
W4	56
W5	48
W6	50
W7	49
W8	56

W9	59
W10	53
W11	53
W12	45
W13	47
W14	47
W15	58
W16	63
B1	52
B2	51
B3	51
B4	64
B5	55
B6	56
B7	59
B8	65
B9	57

W: Well water samples

B: Borehole water samples

Table 10: Water quality legend (Ott, 1978)

WQI values	Legend
0-25	Very bad
26-50	Bad
51-70	Medium
71-90	Good
91-100	Excellent

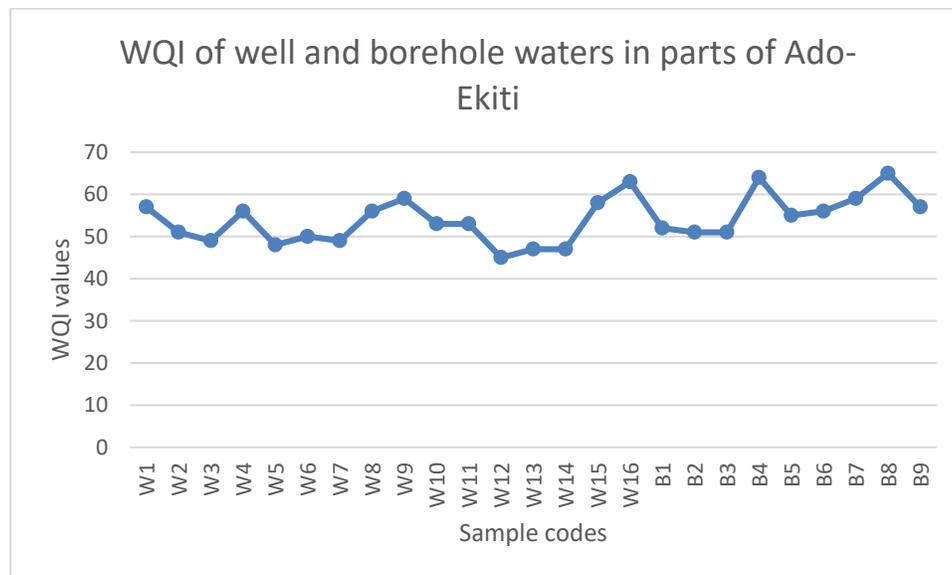


Figure 24: Water Quality Index (WQI) of well and borehole waters in parts of Ado-Ekiti

Codes: Wi = hand dug well

Bi = Borehole water samples

Table 10 revealed that none of the samples fall within the 'good' to 'excellent' category but all the samples obtained from borehole had WQI values greater than 50 while samples W3, W5, W7, W12, W13, W14 all obtained from hand dug wells fall under the 'Bad' category.

3.6. Agricultural uses

Table 13 shows the water quality criteria for livestock (UNESCO, 1972). From the table, it is evident that the maximum concentrations of the ions and trace elements fall below the upper limit recommended by UNESCO. Hence, the groundwater in Ado-Ekiti is suitable for use in livestock breeding.

For irrigation purposes, high salt concentration in soils may harm plant growth hence, salt index is adopted in classification of groundwater. It is expressed as;

$$\text{Salt Index (SI)} = \text{Na}^+ - 24.5 - 4.85 (\text{Ca}^{2+})$$

Negative SI values indicate suitability for irrigation and table 14 shows that all the values obtained for this study are negative indicating suitability for irrigation.

Hardening of soils and reduction in soil permeability have been attributed to the presence of sodium in irrigation water. This phenomenon is described as sodium hazard. It is a result of the substitution of calcium and magnesium ions by sodium ions on clay minerals and colloids (Chapman, 1977). The extent of the exchange which is the amount of sodium absorbed by soil, can be estimated from the Sodium Adsorption Ratio (SAR), which is defined as

$$\text{SAR} = \frac{\text{Na}^{2+}}{\sqrt{\frac{\text{Ca}^{2+} + \text{Mg}^{2+}}{2}}}$$

Table 15 shows the SAR values obtained for well and borehole water samples and are compared with the Sodium hazard standard and SAR classification of water (after Sawyer and McCarty, 1967) to show that the waters are soft and have low sodium hazard.

Table 11: Classification for irrigation using electrical conductivity (µs/cm) (after Todd, 1980)

Water class	Electrical resistance (µs/cm)	This study (µs/cm)	
		Well range	Borehole range
Excellent	<250		
Good	250-750		
Permissible	750-2000		212-851
Doubtful	2000-3000	180-2012	
unsuitable	>3000		

Table 12: Water classification based on TDS (after Gorrel, 1965)

Classification after Gorrel (1965)		This Study (mg/l)	
Water classification	Concentration of TDS in mg/l	Wells	Boreholes
Freshwater	0-1000	91-1000	107-429
Brackish water	1000-10000		
Salty water	10000-100000		
brine	>100000		

Table 13: Water quality criteria for livestock (UNESCO, 1972)

Substance (mg/l)	Upper limit	This study	
		Wells	Boreholes
TDS	10000	91-1000	107-429
SO ₄ ²⁻	1000	58.21-186.62	46.911-133.01
Fl	2.40	0.049-0.072	0.049-0.081
Pb	0.05	0.001-0.005	0.002-0.005

Table 14: Salt index values of groundwater from parts of Ado-Ekiti

Sample code	SI values
W1	-35.03
W2	-39.53
W3	-47.98
W4	-49.48
W5	-48.77
W6	-44.40
W7	-35.01
W8	-54.22
W9	-50.21
W10	-54.21
W11	-35.06
W12	-43.26
W13	-40.15
W14	-49.59
W15	-45.47
W16	-54.12
B1	-53.14
B2	-39.2
B3	-39.1
B4	-44.24
B5	-39.35
B6	-44.65
B7	-49.66
B8	-42.65
B9	-46.27

Wi = Well water samples

Bi = Borehole water samples

Table 15: SAR values of groundwater from Ado-Ekiti

Sample code	SAR values
W1	0.086
W2	0.06
W3	0.057
W4	0.06
W5	0.045
W6	0.055
W7	0.099
W8	0.057
W9	0.059
W10	0.065
W11	0.082
W12	0.056
W13	0.074
W14	0.068
W15	0.056
W16	0.11
B1	0.067
B2	0.077
B3	0.053
B4	0.053
B5	0.069
B6	0.081
B7	0.064

B8	0.082
B9	0.085

Wi = Well water samples

Bi = Borehole water samples

Table 16: Comparison of results with Sodium Hazard Standard and SAR classification (after Sawyer and McCarty, 1967)

SAR classification			This Study	
SAR values	Sodium Hazard (Alkali)	Description	Wells	Boreholes
0-10	Low	Soft water	0.045-0.11	0.053-0.085
11-18	Medium	Slightly hard		
19-25	High	Moderately hard		
26	Very high	Very hard		

Groundwater quality depends on the substances dissolved in the water and certain other properties and characteristics that these substances impart to water (Singh et al., 2000). The chemical constituents of groundwater depend on the source, movement and environment of the water (Domenico, 1972). Primarily, soluble salts found in water originate from solution of rock materials (Foster, 1942) and the presence of chemical constituents in water has been found to result from leaching of the underlying bedrock or the overburden (Pescod, 1977). These all point to the fact that rock mineralogy has a great influence on the groundwater quality of an area. In this study, the concentrations of most of the studied parameters are slightly higher in the well water samples. This is due to the shallower depths of the hand-dug wells. Boreholes which are at greater depths produce safer waters as revealed in the WQI curve in Figure 9.

The presence of sodium and potassium in the groundwater can be explained with the lithology of the study area. The sodium is sourced from the weathered granites and charnockitic rocks that contain plagioclase feldspars while the potassium is connected to rocks made of orthoclase feldspars e.g. weathered microcline that infiltrate the groundwater. The magnesium ion can be attributed to the presence of feldspars as well as ferromagnesian minerals.

The mean concentration of nitrates in the well water samples is higher than in the samples obtained from the boreholes, this could be due to the fact that some of the wells are dug close to sewage disposal systems. More so, nitrates in fertilizers and manure can leach through the soil into the groundwater. This situation is limited in boreholes due to their greater depths.

The presence of sulphate ions may be attributed to the combustion of fossil fuels such as petroleum and coal. Owing to the fact that a negligible amount of sulphate ion is found in most minerals, its presence in water is unlikely to be from the bedrocks in the area.

The chloride content may be due to the presence of soluble chlorides from rocks, connate or juvenile waters or contamination by domestic or industrial sludge.

Overall, the groundwater in the study area can be considered as safe for domestic, agricultural and Industrial usage although purification procedures are still recommended.

IV. CONCLUSIONS

Due to the ever increasing growth in population in the study area, there is an added strain on the available water resources leading to an increase in groundwater exploration. The results of this study will go a long way in establishing the portability of the waters for domestic, agricultural and industrial purposes.

The type of water that predominates in the study area is Ca²⁺-Cl⁻-SO₄²⁻ type which has been attributed to the geology of the area in which the major rock types are charnockites and granites with superficial deposits of clay and quartzites. The water type could also

have been influenced by domestic and industrial effluents that may leach into the aquifer systems. Other contributing factors may include combustion of fossil fuels such as coal and petroleum.

The mean values of most of the parameters measured falls below the permissible limits recommended by WHO (1971, 1993), NSDWQ (2007) and USEPA (1976) except in isolated cases where conductivity, TDS and nitrate concentrations exceeded the limits.

Trace element concentrations also fall within the acceptable range recommended by WHO (1971, 1993) although the mean concentration of manganese exceeds the 0.05mg/l limit recommended by USEPA (1976) for domestic water use.

The Water Quality Index (WQI) which was carried out using turbidity, pH, nitrates, phosphate and TDS as test parameters revealed that about 35% of the well waters gave values that fall within the 'Bad' range on the water quality legend while the remaining 65% were within the 'medium' range. All the borehole waters had WQI values within the 'medium' range. In order to obtain a more conclusive result, it is recommended that subsequent works carried out should include tests for the amount of fecal coliform, Biochemical Oxygen Demand (BOD) and Dissolved Oxygen (DO).

T-test carried out revealed that there is no significant difference between the concentrations of the various parameters in the well and borehole waters.

Comparison of the results with sodium hazard standards and SAR classification (After Sawyer and McCarty, 1967) revealed that the groundwater has low sodium level. The waters can also be described as soft.

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Comprehensive sustainable cultivation development plans based on statistical/ mathematical models

- A brief review of the literature

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Abstract- The development of agricultural sector directly influences the level of global development of economies and societies. Due to rapid increase of the population, demand for food has increased. The rehabilitation of extensive ancient agricultural network and massive new development in this sector is the viable solution for this pressing problem. Thus there should be a proper cultivation plan. This study presents a comprehensive review of the literature published between 1998 and 2018 on sustainable cultivation development plans based on statistical/ mathematical background which have considered major influential factors for cultivation. This study aims at reviewing the most appropriate sub sections: arable land selection, cultivating methodologies and climatic factors effect on cultivation which need to build a sustainable cultivation plan. A review was carried out using the following search terms: cultivation plan, optimal harvest, agricultural plans, development of agriculture, arable land selection, climatic factors effect on cultivation, cultivating methodologies and optimal cultivation plans. Articles published in English language were considered. Searching strategy was fails to identify a published article which considered the aforementioned three aspects together. Thus this study was done by using articles focus on sub sections separately and discussed with mathematical or statistical models.

Index Terms- Arable land, Optimal cultivation plan, Optimization techniques, Sustainability

I. INTRODUCTION

The agriculture is the back born of the economy of most of the Asian countries. Although the country is moving towards industrialization, the agricultural sector still continues to be an important sector in the economy. Due to rapid increase of population, demand for food is increasing. If the agricultural sector fails to supply and meet the rising demand of food, it will affect the economy of a country. Therefore, it is essential to find a viable solution, that is balanced supply demand food chain. For that, there should be an organized agricultural strategy. To fulfil subsistence food needs, it is important to have a proper cultivation plan in agricultural sector. This paper reviews the literature on statistical/ mathematical models which were used to develop a sustainable cultivation plan.

Lack of a proper cultivation plan is a threat for sustainability of the traditional farming in large rural areas. A proper cultivation plan will provide details of which crop should be cultivated in which area, the quantity that should be cultivated and the best time period for cultivation. On the other hand, consideration of environmental factors effect on cultivation will lead to achieve a best plan for sustainable cultivation. The present study is an attempt to review the various models, approaches and techniques specifically used for optimum cultivation planning. However, this study evaluates the statistical/ mathematical models which have been used various programming approaches for the development of agricultural sector.

Water management is an important part of agriculture. In general, researches have formulated various models for water management. Dai and Lia proposed that, developing a linear programming (LP) model for water resources planning and management to cultivation regions can be optimize the exploitation from surface water resources which helps decision makers to determine suitable cultivation pattern [1]. Further Dai and Lia mentioned that, support of the food chain in agriculture is one of the major part of rural development. A predominantly challenge for the agriculture is water management. Some researchers proposed a multistage irrigation water allocation (MIWA) model as a solution for water management by considering fluctuating water availabilities and demands. For many decades, in many countries the scarcity of water resources has become a serious problem due to the rapid population growth and shift in economic development. Agriculture requires the large amount of water, which places even more importance on agricultural water management. By developing a water resources planning model, the watering requirements for plants in arable lands can be fulfilled in full capacity.

To build a sustainable cultivation plan, some articles proposed an optimization model using “assignment algorithms” to recommend a crop type, suitable time period and land. The literature reveals the availability of statistical/ mathematical models for sustainable cultivation plan, but those studies have focused on only one or few factors. Thus this study summarizes the factors effect on cultivation and how to make the sustainable cultivation plan under mathematical background by reviewing many research articles.

Suitable land for particular cultivation can be selected by conducting a soil survey and based on results of the land quality checking and identification of land characteristics. Astee L.Y focused on viability of rooftop farming by considering several factors in his study. In that cultivation plan mainly he concerned about several design constraints for existing block typologies and rain water harvesting using an appropriate method (landscape opportunities) [2]. Based on soil survey results, suitability of the land and suitable crop type can be observed [3].

II. MATERIALS AND METHODS

The following search terms were used in this review: cultivation plan, optimal harvest, agricultural plans, development of agriculture, arable land selection, climatic factors effect on cultivation, cultivating methodologies and optimal cultivation plans. These terms were inserted in the fields “article title,” “abstract,” and “keyword.” In the first search round, a large number of research articles were found related to the sustainable cultivation development plan. This first searching round based on the keywords which are located within the text instead of being matched to subject headings. Then move to the advanced searching, that is, chose to add boolean operators AND and NOT to exclude the headings “cultivation” and “rainfall”. The final search strategy was: [“decision making” OR “Planning and management” AND “statistical techniques” AND “cultivation patterns” AND “agricultural development” AND “profit” NOT “lost”]. These strategies produced about 50 articles that were closer to the topic of interest published between 1998 and 2018. Out of the 50 references identified initially, 25 were excluded after review of the titles and abstracts or else non English publications and research which are not under mathematical background and the summary of final 25 articles is given in the Fig 01.

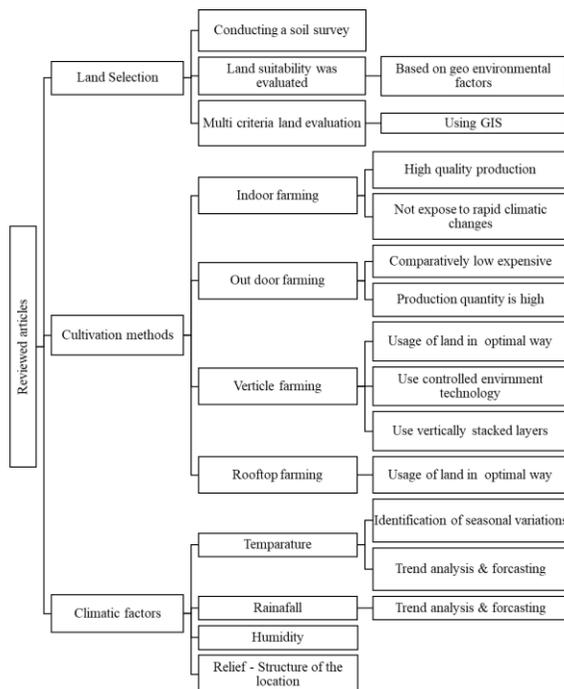


Figure 1: Summary of searched strategy for the period 1998 to 2018

III. RESULTS AND DISCUSSION

Most of the earlier studies deals with a particular specific area in agriculture. Because of that this research was conducted by reviewing different approaches separately.

A. Arable land selection

The main step of a cultivation plan is selecting a suitable land for cultivation which is done by a land evaluation as one of the systematic method. Numerical analysis was conducted by Elsheikh to identify the suitability of land for cultivation by considering the requirements like water, nutrients, avoidance of erosion and etc. [6] By conducting a soil survey and based on land qualities and land characteristics the best land for particular cultivation can be selected. Mathematical models were used to identify the patterns and the variations of the identical factors related to soil selection. Astee L.Y discussed viability of rooftop farming by considering several factors in his study. Mainly he concerned several design constraints for existing block typologies and rain water harvesting in appropriate method in his study [2]. Arable land can be identified by conducting a soil survey. Allocation of arable land for perennial crops, annual crops and seasonal fruit crops were accompanied according to the seasonal variations of the soil conditions [3]. Elsheikh proposed an intelligent system for assessing arable land for cultivation of different kinds of crops. Geo environmental factors were considered in that study and further he proposed agricultural land suitability evaluation which was helped to determine the quality of land for cultivation. Further this study was intended to support decision makers to plan and make decisions related to cultivation [4]. Using geographic information system (GIS) Ceballos proposed a multi criteria evaluation approach to identify arable lands for cultivation. Further, numerical analysis was conducted in that study to evaluate the land suitability [5]. As literature implies further about the sustainable cultivation, selection of suitable land for cultivation is a must. Specifications of the numerical models used in articles are summarized in Table I.

Table I: Description of the specifications of the numerical models used in referred articles.

Study category	Number of articles	Summary	Country where study was carried out	Reference number
Arable land Selection	4	Optimization of land resource - Rooftop farming	Singapore	1
		A dynamic program for calculation of eigenvalues and eigenvectors of a weighting matrix is provided. Expertise and	Malaysia	3

		knowledge help ensure that ALSE databases represent realistic, practicable and functional systems. Optimization of land resource – Vertical farming	USA	7
Cultivation method	7	Optimization of land resource – Vertical farming	New York	7, 8
Climatic factors	11	Climate change will have a significant impact on smallholder profitability economic impact of climate change on agriculture The effect of rainfall intensity on soil erosion and particulate phosphorus transfer from arable soils Prediction of temperature	Sri Lanka	12
			USA	13
			UK	14
			India	19

increasingly relevant part of the movement toward sustainable urban agriculture [9 - 12].

Climatic changes have a significant impact on smallholder and farmers profitability in Sri Lanka [13]. Further, global warming causes the huge harm to agriculture in developing countries as many arable lands in the low latitudes already endure climates that are too hot [14]. By forecasting rainfall data with in the study area, a proper cultivation plan can be developed by including the major factor affecting cultivation [15]. By developing an inter-annual, inter-decadal and long-term trends of extreme rainfall, farmers can get rid of disasters occur due to rainfall [16]. Figure 2 illustrate the environmental factors effect on cultivation. By improving sustainable production by investigating all influential factors like water resources, temperature, humidity, rainfall, soil type, fertilizers, pest insects, crop rotation and etc. will lead to improve the yield.

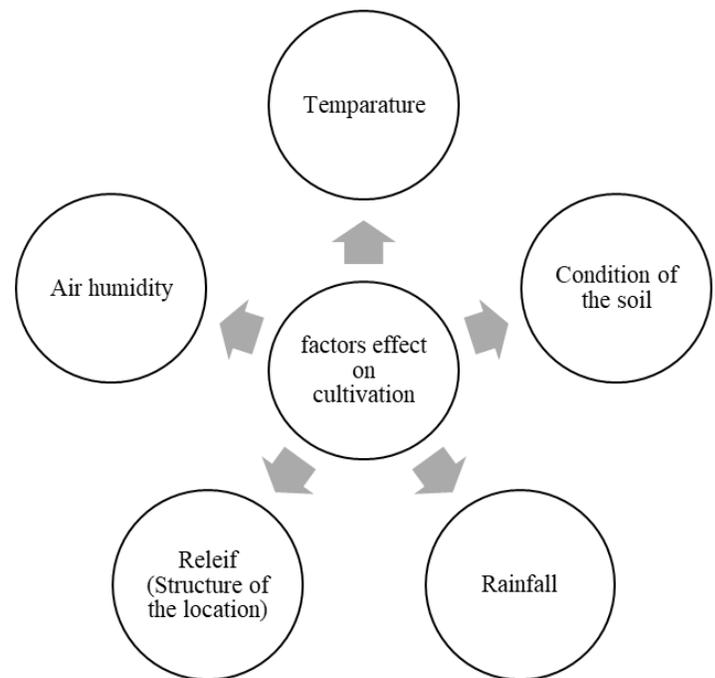


Figure 2: Environmental factors affecting cultivation

B. Cultivation Methodologies

In order to obtain high quality vegetable product, Gruda proposed that indoor production is more profitable than outdoor production for vegetables based on quality of the product [6]. The reason that the researcher mentioned in his study is: indoor productions are not exposed directly to the rapid climatic changes. Further, conditions created with in the cultivated environment will effect on quality of the production. On the other hand, there are considerable environmental harms like soil degradation, pollution of ground water and surface water. Although indoor production is popular and effective cultivation method, it may course huge environmental disasters like greenhouse effect.

C. Climatic factors effect on cultivation

Geographical changes like availability of slopes, mountains and urbanization are challenging the horizontal farming in most agrarian countries. To avoid or minimize this challenge, many researchers proposed a most appropriate solution to overcome problems as use of controlled environment technology vertically stacked layers commonly integrated into other structures like a skyscraper, shipping container or repurposed warehouse and produce food in it. This is known to be vertical farming which practice the cultivation on vertically inclined surfaces [8]. Aforementioned innovative method, commonly referred to as vertical farming has emerged in recent years and has become an

Evaporation and transpiration together called evapotranspiration. The combination of two separate processes whereby water is lost on the one hand from the soil surface by evaporation and on the other hand from the crop by transpiration is referred to as evapotranspiration (ET). By considering the relationship between saturation vapor pressure and temperature, evapotranspiration was calculated [17]. This is one of the most important considerable factor on cultivation. Rainfall is obviously key factor which influence on cultivation. It is very important to decision makers to have a proper model to forecast rainfall for particular cultivation areas. Using Mann-Kendall statistical analysis, Nikhil, was able to identify the characteristic of seasonal and monthly rainfall. To find out the trend of rainfall researcher used Kendal’s rank correlation statistics and wavelet analysis [18]. Seasonal variation is important as different crops require water at different times. Due

to soil moisture deficit sustainable plant growth cannot be expected. Reasons for soil moisture deficit are high temperature, high rates of evapotranspiration and very dry soil.

Similarly, conducting a trend analysis on temperature, erratic pattern can be identified. Further, based on a proper predictive model, the temperature for future period of time can be forecasted [19]. Farmers adapted to the climatic changes and they have confidence in dealing with climatic changes. Because of engaging in extensive agriculture those communities can decide climatic changes which can affect to their cultivation. Bryant discussed adaptation of agricultural communities in his study area to climatic variability and change [21]. The effects of climate change on rice production was investigated by Mukand using the CERES-rice crop growth model [22-25]. In that study, the CO₂ concentration, temperature and rainfall data were simulated, seasonal patterns were identified and forecast them under the objective of identification of effect of climatic factors on rice production.

Based on most important factors effect on cultivation and resources available in the region many researches have faced limitations and delimitations. Several factors have been identified as agents for improving agricultural production such as consideration of technical changes in agriculture, contribution of land productivity to total output of crops, estimation the growth rate of productivity of crops and etc.

IV. CONCLUSION

This study sought to present and discuss the comprehensive sustainable cultivation plans under statistical/ mathematical background through a review of the literature. A worldwide trend toward standardization of the agricultural process with optimal cultivation strategy was observed, especially concerning the influential factors of the cultivation. Mathematical models developed for selecting arable lands for selected crop's cultivation. By developing an optimization problem for water resource management system for farmlands have increased 8% of the net profit. Further, this can be implement for all other factors which are basic needs of cultivation. Due to availability of small number of published articles about the development of sustainable cultivation plan under mathematical/ statistical background there is still a tremendous scope for improvement in model for sustainable cultivation plan. Finally, one limitation of the present study is the absence of published articles which have considered all influential factors together on cultivation.

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A Brief View of Gandhiji's Life and Philosophy

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Abstract- Mahatma Gandhi was one of the greatest human being of India. His life journey inspires us to lead our life in the way of truth. His mother's religious approach highly influenced his life and inspired him to be truthful and an honest person. Mahatma Gandhi was a person who dedicated his life for freedom movement. During that period he launched Civil Disobedience Movement, Non Cooperation Movement and Quit India Movement.

Mahatma Gandhi followed the principle of idealism. He always believed in absolute and immortal existence of God which we all have as our souls. He always focuses on development of moral and spiritual character of human being. He mainly stresses on better social integration, endless love for human beings which all have a positive impact on mental health. His concept of truth, satyagraha, honesty, non violence gives us psychological strength. The purpose of the paper is to throw some light on Gandhiji's life and to study his philosophy his of life. Another objective of the paper is to study the present relevance of this thoughts.

Index Terms- MAHATMA GANDHI, PHILOSOPHY, TRUTH, NON VIOLENCE, SATYAGRAHA etc.

I. INTRODUCTION

The great human being Mahatma Gandhi was born in 1869 in Porabandor, Gujrat on 2nd October. From the beginning of his life he was influenced by his mother's religious approach and thought and this thought inspires him to be truthful and honest person. Gandhiji went to England for studying law and returned India in 1891. In 1915 he started non violence Civil Disobedience movement against British government. Assuming leadership of Indian National Congress in 1921, Gandhi led nationwide campaign for easing poverty, expanding women's right, building religious and ethnic amity, ending untouchability and above all achieving Swaraj or self rule. Along with this, Gandhiji believed in simple living and high thinking. He lived in self sufficient residential community and had simple vegetarian foods. He also observed fast for self purification. Gandhiji protested against British imposed salt tax and organize Dandi March in 1930. He was arrested in 1942 for Satyagraha Andolan and after release from jail he started Quit India movement. At last struggles of our freedom fighters brought independence in 1947 15 August. He was imprisoned number of time both in India and south Africa.

The contribution of Gandhiji towards Indian education was remarkable. He developed Basic Education System to make student self reliant. According to him the main aim of education should be to develop all aspects of human – body, mind and spirit.

Gandhiji deeply realized the need of economic independency of every individual. Thus he wanted to introduce a craft based education system to reduce the problem of educated unemployment. He wanted the pupils to learn their native professions- agriculture and cottage industry. This would bring economic prosperity and enable them to choose independent career, be self sufficient. He further added, "the field of education which holds that the seeds of the future children to the soil, requires absolute sincerity, fearlessness in the pursuit of truth and boldest experiment, provided always that they are sound and based upon deep thought, matured and sanctified by a life of consecration."

GANDHIJI'S PHILOSOPHY OF LIFE- Gandhiji strongly followed the principles of idealism. He always believed in spirituality of human beings. He stated that the ultimate goal of human life is the self realization that is realization of God within ourselves. Therefore, the goal of religion should be to make a Hindu better Hindu, make a Muslim better Muslim, make a Christian better Christian and so on. He always mentioned that if we want to achieve something we must work hard but if we want to reach at the highest level we must do the right thing and if necessary we should follow a new path. The main element of Gandhiji's philosophy are- believe in God, truth, nonviolence, satyagraha, Sarvodaya.

Believe in God- As a strong believer of Almighty Gandhiji always fell supremacy of God. He realizes God within himself. His deep faith on God gives him power for doing anything and everything in life.

Truth- According to Gandhiji truth is nothing but the reflection of God. Therefore, in his autobiography "My Experiment with Truth" he had mentioned that truth can be achieved truth in wider sense, where truth does not only means being truthful in speech but truth should be applied in all fields of life. According to him, we can feel the existence of God when we follow the three principle that is truth, beauty and goodness and apply truth in our speech deeds and actions. Thus, for Gandhiji truth and God is one. God is the ultimate immortal super power who created the universe and we can realize God within ourselves only by following the path of truth. Gandhiji also stated that, truth and ahimsa are inseparable. They are like two sides of same coin. Ahimsa is the means and truth is the end.

Non violence- Another important feature of Gandhiji's philosophy is non violence (ahimsa). Ahimsa is a strong weapon to conquer the world. He had a strong faith on ahimsa and said that this love and non violence are very essential to have triumph over hate and violence. According to him violence can bring imbalance to society and threatened the inner peace of the society. Thus, non

violence is the weapon for strong minded people which can develop different qualities like tolerance, self suffering, patience, self sacrifice, love and sympathy. He explained ahimsa in the following manner ‘ ahimsa is complete absence of ill will against all that live. In its dynamic condition it means conscious suffering. Non violence in its active form, is good will towards all life. It is pure love.’ Therefore, non violence is complete self restraint against all evils.

II. SATYAGRAHA

Satyagraha is the application of ahimsa in practical life or action. Here the opponent party does not get any type of physical or mental pain. On the contrary, it is the process of self suffering. It means that satyagrahi bears the pain. Gandhiji mentioned that satyagraha needs a great deal of sacrifice. It is very difficult to make the country ready for satyagraha as it requires plenty of pressure. Satyagraha purifies the soul of practitioner. As the literal meaning of satyagraha is holding on to the truth, the satyagrahi encounters the truth. Satyagraha is used in wider sense which include civil disobedience to construction of other political party. The essence of satyagraha had been developed from the concept of ahimsa. While developing the concept of satyagraha Gandhiji was influenced by the thoughts of Leo Tolstoy and Henry David Thoreau, from the Bible and Bhagavad Gita.

So, satyagraha can be applied in today's life also. If a political party support dishonesty, terrorism, corruption we can fight against them by disobeying. But the satyagrahis must be fearless to bear all kinds of pain and self suffering. Gandhiji always laid emphasis on moral discipline of satyagrahis, they must have faith on God. They must follow the rules of their satyagraha and command of their leader. But satyagraha can be used for personal gain. It is a process of eternal love and a fearless protest against violence.

III. SARVODAYA

The term Sarvodaya is a Sanskrit word which means universal upliftment or progress of all. This term was first coined by Gandhiji in 1908 as the title of his translation of John Ruskin's tract on political economy, unto this last. Sarvodaya basically stands for decentralization of power it may be political, economic and social. As oppose to Marxism Gandhiji believed in non violent means to remove capitalism. Gandhiji wanted a society which is free from violence and built on moral principles, humanitarianism and equality. He mentioned that “ I shall work for an India in which the poorest shall feel that it is their country, in whose making they have an effective voice, an India in which there shall be no high class or low class of people, an India in which communities shall live in perfect harmony.”

He emphasized on the decentralization of power to decrease the concentration of power on the hands of few, rather it should be distributed to many. Therefore, he stresses on Panchayat Raj Institution which demands participation of everyone. Sarvodaya society is based on equality and liberty where love, fraternity, tolerance will developed. The society should be exploitation free and there must be recognition of dignity of labour. Gandhiji also stressed on minimization of unnecessary and unhealthy competition. Sarvodaya attempts to create a society which brings

welfare of every individual. It also gives importance on self dependency.

IV. CONCLUSION

It is very difficult to describe the life of great human being Mahatma Gandhi in some few words. As a idealist he always gave importance on all round development of individual. But his main focus is on character formation. He said, when character is lost everything is lost. So according to him the main of education should be character and personality development. Cultural aspect of education is more important than literary aspect, because through cultural aspect children can learn conduct and ideals of life. Although his concept of Sarvodaya and basic education is not fully applicable in today's world but we can not deny his significant contribution to our country. His idea of decentralization of power, secularism, prohibition of untouchability, elimination of caste system are very essential for the success of democracy. Another key concept of his philosophy is socialism. His view of socialism is to create a classless society with no poverty, no hunger, no unemployment. Today's plan like Sarva Shiksha Abhiyan, Ayushman Bharat, Skill India program derives their core values from Gandhian Philosophy. He is a Mahatma in true sense who always aimed to develop human resource.

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Prevalence and Clinico-Pathological Studies on Trematodiasis in Marine Turtles in Indonesia

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Abstract

*The purpose of this study was to determine the prevalence and clinico-pathological changes associated with cardiovascular fluke infections in marine turtles in Indonesia. Prevalence and clinico-pathological changes associated with flukes infesting other organs were also determined. The heart and associated blood vessels from all samples were examined for the presence of flukes. The heart flukes from a sub-sample of 224 sea turtles were collected and counted to determine the level of infection. Pathological examination was done on 224 sea turtles selected for determination of the level of infection. Blood samples were collected from 134 *C mydas*, for RBC, PCV and Hb analyses. The prevalence of infection in both species was 100%. The intensity of infection varied between 9 - 197 flukes per turtle. Anaemia, hydropericardium, hydroperitoneum, thickening and hardening of arterial walls, as well as the presence of flukes in the heart, were characteristic gross lesions observed. Microscopically, egg granulomas, presence of flukes, endarteritis and/or perivascular cuffing, and central necrosis were prominent. Other flukes were also consistently found (100%) in all parts of the gastrointestinal tract, and in 40% and 48% of urinary and gall bladders examined, respectively. Negative correlations were found between the total number of cardiovascular flukes and RBC ($R_s = -0.55$, $P = 0.001$), PCV ($R_s = -0.56$, $P = 0.001$), and Hb concentration ($R_s = -0.64$, $P = 0.001$), indicating that their presence was associated with some degree of anaemia. On the other hand, the total number of flukes present in places other than the heart and adjacent blood vessel were correlated neither with blood parameters nor bodyweight/curved carapace length ratio. Findings in this study indicated that cardiovascular fluke infection is a major problem in marine turtles in Indonesia, with anaemia and lodgement of adult flukes and/or their eggs causing life threatening illness.*

Key word: Indonesia, trematodiasis, cardiovascular fluke, prevalence, Pathology

I. Introduction

Before 1980 most reports of diseases in marine turtles concerned those in farms or oceanariums, and generally associated with husbandry factors such as improper construction of tanks, inadequate nutrition and sanitation, poor water quality and overcrowding, and biting behavior.^{1,2,3,4,5} More recently however, concern about the survivability of marine turtles in the wild, and the impact of human activities on this has grown, as has interest in diseases or potential diseases that may affect them. Diseases such as cutaneous fibropapillomatosis^{6,7,8,9}, spirorchidiosis^{10,11,12,13}, ectoparasitism^{14,15,16}, and coccidiosis¹⁶ have all been identified as possible contributors to the decreasing of population of wild sea turtles.

As well as cutaneous fibropapillomatosis, which is of major interest⁹, cardiovascular fluke (CVF) infection (spirorchidiosis) is another potentially life threatening disease of marine turtles in the wild^{10,12,13,17,18}. These digenetic trematodes belong to the family Spirorchidae^{19,20,21,22,23}. This disease is characterized by a focus of inflammatory cells associated with flukes or their released eggs surrounding blood vessels in any tissue^{10,12,13,17,23}.

The prevalence and epidemiology of CVF have been described in green and loggerhead turtles^{22,23} and however, as such study was mainly based on field necropsy of dead or moribund turtles, the results may be misleading if used to estimate the actual prevalence of infection and its impact on the wild population of sea turtles²⁴.

The purpose of the present study was to determine the prevalence and clinico-pathological changes associated with spirorchids infections in slaughtered marine turtles in Indonesia. These animals are more likely to indicate the levels of disease in wild populations than are the moribund animals examined in previous studies. In addition, prevalence and clinico-pathological changes associated with flukes infesting other sites such as those in the intestine, urinary bladder, and gall bladder were also determined. This study was part of a larger study entitled "Diseases and Husbandry Aspects of Wild-Caught Marine Turtles in Indonesia".

II. Materials and Methods

Collection of material

Observations were made and samples were collected at a turtle abattoir near Tanjung Benoa Bay, Bali, during January 1994 to December 1994, five years before all species of sea turtles are protected in Indonesia. The curved carapace length (CCL) of the turtles varied between 39 cm - 116.5 cm (mean ± SD = 76.8 cm ± 22.6) and originating from various capture sites in the Indonesian seas (**Fig 1**). Turtles were transported to Bali by boat and were slaughtered one to 20 days following their arrival. Details of turtles examined for this purpose, in relation to capture sites, maturity status, and sex are presented in **Table 1**.

Table 1: Total turtles examined clinically for trematodiasis and after slaughter in abattoirs in Bali, in relation to their capture site, maturity status, and sex.

	<i>Chelonia mydas</i>				<i>Eretmochelys imbricata</i>			
	Mature		Immature		Mature		Immature	
	Male	Female	Male	Female	Male	Female	Male	Female
Java Sea	19	132	77	205	-	-	20	71
Teluk Cempi	0	12	11	39	-	-	9	30

Wakatobi	10	37	8	9	1	1	1	7
Aru	41	140	7	6	-	-	-	-
Berau	56	119	4	7	-	-	-	-
Bird's Head of Papua	39	128	-	-	-	-	-	-
Sukamade	44	102	-	2	-	-	-	-
Pangumbahan	51	104	-	-	-	-	-	-
Total	260	774	107	268	1	1	30	108

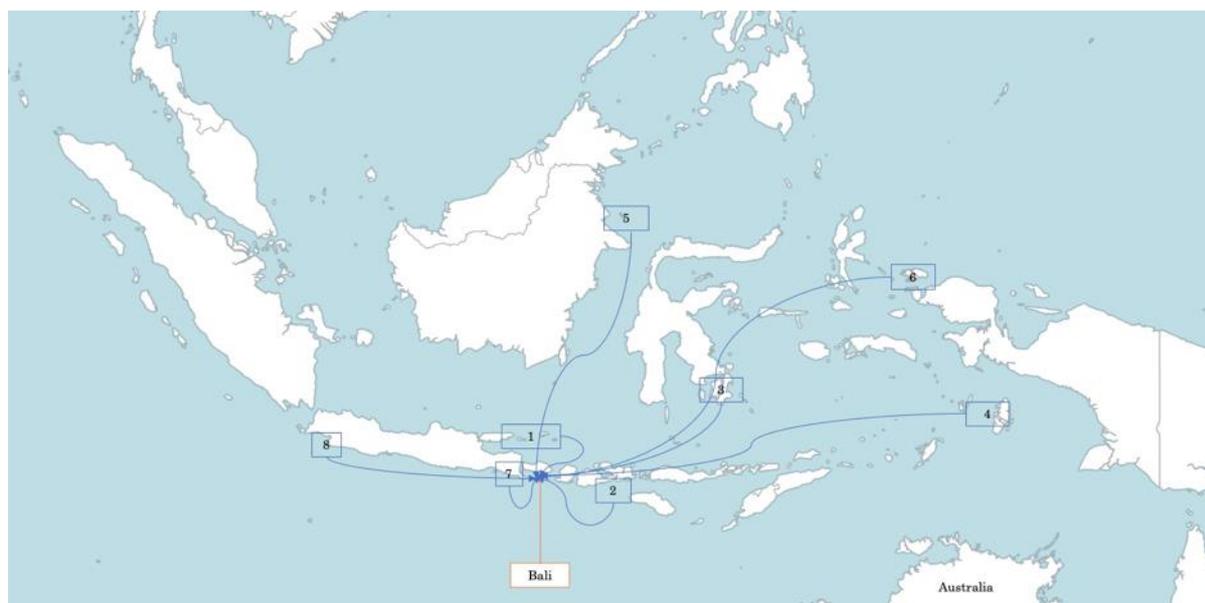


Fig 1: Capture sites of marine turtles examined during the study. 1 (Java Sea), 2 Teluk Cempi, Sumbawa), 3 (Wakatobi, South-East Sulawesi), 4 (Aru), 5 (Berau, East Kalimantan), 6 (Bird's Head of Papua), 7 (Sukamade, East Java), and 8 (Pangumbahan, West Java).

Determining the prevalence of infection

During slaughtering, the heart and associated blood vessels from each of 1409 *C mydas* and 140 *E imbricata* were examined for the presence of flukes. To determine the level of infection of CVF, the heart flukes from a sub-sample of 195 *C mydas* and 29 *E imbricata* were collected and counted. The prevalence and levels of infection with flukes in the gut, urinary bladder, and gall bladder, however, were determined in only 134 *C mydas*.

Collection, fixation, staining procedures, and identification of flukes were done as follows. After the turtles were slaughtered and the plastron was removed, the organs, were separated into: (a) the alimentary tract, (b) urinary bladder, (c) gall bladder, and (d) heart and adjacent blood vessels (approximately 10 cm length). The alimentary tract was then separated into stomach, small intestine, and the large intestine. All of these organs were put into separate buckets (volume approximately 2 litres) filled with a saline solution (formula: 1 part sea water and 3 parts tap water). It should be noted that an attempt was also made to collect flukes from

the liver, spleen, kidneys (with attached ovary/testes), and lungs (including trachea), by slicing them into several pieces (almost all the way through), followed by the procedure applied also for the heart and adjacent blood vessels, gut, gall and urinary bladder. However, as this practice inconvenienced the butcher and the abattoir owner, it was discontinued.

The presence of flukes in the gastrointestinal tract, urinary bladder, the gall bladder, and the heart were evaluated after these organs were cut open, then turned inside-out, and all their contents washed carefully into saline (the surfaces being rubbed gently to dislodge the parasites). In addition, these organs were agitated in the sea water filled buckets every few minutes for about 30 minutes, after which they were removed, and the buckets and their contents, were then swirled repeatedly, allowing intervals of a few minutes for particulate matter to settle. Sea water was then decanted gently. This washing/sedimentation process was repeated until the supernatant was clear, and when appropriate, was transferred to a smaller container. After the water was reduced as much as possible, hot formalin (10% neutral buffered formalin) was poured on top of the flukes quickly (to prevent the flukes from being curled), and then, they were removed into petri dishes, and immediately observed, identified and counted under the dissecting microscope.

Parasites were washed in distilled water, stained by placing them in glass cavity blocks filled with 3-5 ml Gower's Carmine or Delafield's solution²⁵. After approximately 24 hours, the stain was discarded, and the worms were rewashed in distilled water. Depending on the intensity of the stain taken by the worms, they were de-stained by 0.5% HCL solution, until the stain was removed from the parenchyma, but the gonads were pale pink. After being partially de-stained in this manner, the worms were put into Scott's substitute tap-water for about five minutes, followed by dehydration through an alcohol series (70, 90, 95, and 100%). Dehydration in each concentration of alcohol was for about 30 minutes. Clearing was done by xylol, and Canada balsam or permount were then used to mount the worms before labelling. Identification was done using light microscopy based on manual provided by Blair (unpublished)²⁶.

Pathological examinations

A complete pathological examination was done on 224 sea turtles selected for determination of the level of infection of CVP. At slaughter of the turtles, organs were first examined in situ, then a more detailed examination was done after viscera were removed. The slaughter was done by a standard butchering procedure applied in the turtle abattoir.

For histopathology, irrespective of whether or not gross changes were noted, representative tissues from 224 marine turtles were taken. Included were all major organs viz. brain, eyes, salt-secreting gland, lung, liver (sometimes with gall bladder), kidney, urinary bladder, spleen, heart, gonads, and gastrointestinal tract with pancreas. These were fixed in 10% neutral buffered formalin, and after paraffin embedding, sections cut at 6 μ m, were stained with haematoxylin and eosin.

Haematological examination

Blood samples were collected from 134 *C mydas* in which the flukes in organs such as the heart, gut, urinary and gall bladders were collected and counted. Blood collection was done for adult (CCL more than 85 cm)²⁷ and immature turtles²⁸. All samples were sent on ice, directly to the Disease Investigation Center office in Bali for determination of RBC, PCV, and Hb.

Determining correlations between total heart flukes or total flukes found in other organs, with bodyweight/CCL ratio and some blood parameters

Such correlations were ascertained in the 134 green turtles from which blood was collected as above. These turtles were of varying size (CCL = 37.2 cm to 110.2 cm). All had been captured in approximately the same habitat (ie waters around the Java Sea in the eastern part of Java), during May 1994. Following their capture, all turtles experienced an "out of water" period of approximately nine days during transportation to Bali, and while being kept in the temporary holding areas for two to three days before slaughter. Bodyweight was measured and blood samples taken twice, ie immediately after the arrival of the turtles (at the unloading site), and immediately before slaughter.

Statistical analysis

Flukes were grouped into two groups according to location where they were found; those found within the heart, and those collected in the gut, urinary and the gall bladders. Total flukes in each of these two broad locations were then correlated with the bodyweight/CCL ratio and blood variables such as RBC, PCV, and Hb by means of a bivariate Spearman Rank Correlation test²⁹.

III. Results

Prevalence of the cardiovascular fluke's infection

All samples examined harbored cardiovascular flukes (CVF). The prevalence of infection in both *C mydas* and *E imbricata* was 100%. Based on the examination of 195 *C mydas* and 29 *E imbricata*, flukes of six genera of the family Spirorchiidae were associated with cardiovascular lesions. In order of decreasing prevalence, they were *Learedius* (89.7%), *Hapalotrema* (36%), *Neospororchis* (12.5%), *Amphiorchis* (1.3%), *Spororchis* (0.9%), and *Monticellius* (0.9%). All of these flukes were identified in *C mydas*, but only four genera namely *Learedius*, *Hapalotrema*, *Neospororchis*, and *Amphiorchis* were found in *E imbricata* (**Table 2**).

Learedius sp was the most prevalent CVF in *C mydas*, as evidenced by its prevalence in 193 of 195 (99%) green turtles examined. *Learedius sp* was found either as a single invader (116 of 193 - 60.1%), or in combination with other heart flukes (**Table 3**). In 77 *C mydas* infected with two or more genera of heart flukes, a combination involving *Learedius* and *Hapalotrema* was the most common (57 of 77 - 74%).

Table 2. Prevalence of cardiovascular infection, in relation to the genera of the fluke, in a total of 224 turtles, composed of 195 *C mydas* and 29 *E imbricata*. Numbers in brackets are the total numbers of each species of turtle infected.

Fluke	Species and number of infected turtles	Total turtles infected	Prevalence (%)
<i>Learedius</i>	<i>C mydas</i> (193)	201	89.7
	<i>E imbricata</i> (8)		
<i>Hapalotrema</i>	<i>C mydas</i> (60)	82	36
	<i>E imbricata</i> (22)		
<i>Neospororchis</i>	<i>C mydas</i> (27)	28	12.5
	<i>E imbricata</i> (1)		
<i>Amphiorchis</i>	<i>C mydas</i> (2)	3	1.3
	<i>E imbricata</i> (1)		
<i>Spororchis</i>	<i>C mydas</i> (2)	2	0.9
<i>Monticellius</i>	<i>C mydas</i> (2)	2	0.9

Hapalotrema spp. was another CVF that was of probable importance in *C mydas*. Its prevalence was 30.3% (59 of 193) turtles. It was present as the only genus of CVF found in two *C mydas* but was in combination with other heart flukes in the remaining 57. Other spirorchids namely *Neospororchis*, *Amphiorchis*, *Spororchis*, and *Monticellius* were less prevalent in green turtles. None was found as a single invader, but in combination with *Learedius sp* (**Table 3**).

Table 3. Cardiovascular flukes found in a total of 195 green turtles.

Flukes	No. infested with particular fluke(s)	Prevalence (%)
Learedius (single infestation)	116	59.5
Learedius and Hapalotrema	45	23.2
Learedius and Neospiroschis	17	8.7
Learedius and Amphiorchis	1	0.5
Learedius and Monticellius	1	0.5
Learedius, Hapalotrema, and Neospiroschis	10	5.1
Learedius, Hapalotrema, and Spirorchis	1	0.5
Learedius, Hapalotrema, and Monticellius	1	0.5
Learedius, Hapalotrema, Amphiorchis, and Hapalotrema (single infestation)	2	1
Total infested green turtles	195	100

Unlike in green turtles where *Learedius* was the most commonly found, in hawksbill turtle, *Hapalotrema* was more important. Overall prevalence of *Hapalotrema* infestation in hawksbills was 69% (22 of 29 examined); in two hawksbills this fluke was in combination with other flukes (**Table 4**).

Table 4. Cardiovascular flukes found in a total of 29 hawksbill turtles examined.

Flukes	No. infested with particular fluke(s)	Prevalence (%)
<i>Hapalotrema</i>	20	69
<i>Learedius</i>	5	17.1
<i>Neospiroschis</i>	1	3.5
<i>Hapalotrema</i> and <i>Learedius</i>	2	6.9
<i>Learedius</i> and <i>Amphiorchis</i>	1	3.5
Total infested hawksbills	29	100

Learedius and *Neospiroschis* were two genera that were also found independently in hawksbills. Their respective prevalence was 17.2% (5 of 29) and 3.5% (1 of 29). As in green turtles, *Amphiorchis* in hawksbills was in combination with another fluke (*Learedius*), probably indicating a minor role of this fluke in the hawksbill turtle.

Level of infection

The intensity of infection varied greatly between 9 and 197 (35 ± 30 – Mean \pm SD), and relatively few turtles (28 of 224 - 12.5%) had burdens of more than 65 CVF. This feature was apparent for both turtle species. In green turtles, the average CVF burden was 37 ± 37 (range = 9 - 197), with only a small proportion of turtles (27 of 195 - 12.1 %) having more than 65 CVF. In the hawksbill, the average CVF burden (21 ± 16 , range = 9 - 79) was less and the

majority (23 of 29 - 79.3%) had fewer than 25 CVF.

Clinical signs

Marine turtles from Indonesia examined during this study were wild-captured, and apart from changes such as debilitation, lacerations and fibropapillomatosis³⁰ they showed no overt clinical signs of illness. It was difficult to ascertain to what extent debilitation was due to fluke infection. Most turtles were emaciated, as reflected by a concave appearance of the plastron and a "sunken" appearance of both eyes. They were generally immobile, and unresponsive when approached. Some turtles were reported to have exhibited a buoyancy abnormality and were observed floating in the water. A bloody discharge from the mouth, with a frequent forced expiratory effort was noticed in one green turtle. A continuous shaking of the head to the right side was noted in another green turtle. Additionally, most of the turtles had an indication of external trauma such as wounds on of the front or hind flippers. One had a large irregularly shaped deep wound on the ventral side of the neck.

Pathological changes associated with cardiovascular fluke infection

In general, pathological changes observed in CVF-affected green turtles and hawksbills were comparable to those described in previous reports for loggerheads¹², green turtles^{10,11,13,17}, and hawksbills¹¹. Emphasis here is therefore placed on exceptional or unusual findings not previously described.

Gross findings

Gross changes observed in green and hawksbill turtles were similar. The lesions observed and their prevalence are tabulated in **Table 5**. Anaemia, indicated by paleness and lack of normal coloration of all organs were observed in 34 green turtles and five hawksbills. A total of 29 *C mydas* and four *E imbricata* that were heavily infected by spirorchids (with fluke burdens of more than 60 per animal) all had an excess of one to two liters of clear pericardial (hydropericardium) and peritoneal fluid (hydroperitoneum) as compared to turtles infected lightly.

Flukes were found in any part of the heart chamber (**Fig 2a**), but were mostly on the endocardium of both auricles, especially on the atrioventricular valves. Thickening and hardening of arterial walls, which was sometimes accompanied by thrombosis (either with or without the visible presence of flukes) was frequent (43 of 233 – 18.5%) in the aortic arches (**Fig 2b and c**) in green turtles with a total of at least 60 flukes. A similar lesion was also found

in other blood vessels, such as those beneath the serosa of the gastrointestinal tract (38 of 233 - 16.3%), or within the meninges (35 of 63 – 55.6%) (**Fig 2d**).

Table 5 : The prevalence of gross lesions observed in a total of 231 sea turtles in Indonesia.

Gross lesions	<i>C mydas</i> (N=200)	<i>E imbricata</i> (N=31)
<i>General:</i>		
Anaemia	17	16.1
Hydropericardium and Hydroperitoneum	14.5	12.9
<i>Heart and major vessels:</i>		
Sub-endocardial petechiae	22	32.3
Arterial aneurisms with or without thrombosis	18.5	12.9
Para-aneurismal cysts	3.5	0
<i>Calipee:</i>		
Mucoid degeneration	94	87.1
<i>Gastrointestinal tract:</i>		
Multiple nodules in the serosa and muscularis layer of the stomach and/or intestine	61.5	38.7
Raised linear and darkly pigmented lesions in the intestine	9.5	3.2
<i>Brain:</i>		
Aneurisms and mineralization of the meningeal vessels	56.4	25.8



Fig 2: Gross pathology associated with cardiovascular fluke infection in the heart and blood vessels.

(a) Blood flukes (Digenea: Spirorchiidae) within the heart chamber of a green turtle. Note that the flukes (arrows) are very small (about 0.1 to 0.2 cm length and 0.04 to 0.06 cm wide) and are largely transparent except for the dark, laterally-located vitelline glands and gut. These flukes were identified as *Hapalotrema* which is one of the largest heart flukes in the sea turtle. **(b)** Thickening and aneurysmal dilation of the wall of the aortic arch of a green turtle as a result of entrapped flukes or their eggs. Bar = 20 mm. This lesion, which was frequently accompanied by thrombosis and mineralization, seemed to be associated with the severity of infection as manifested by the total flukes found in the heart chamber. Note heart (short arrow) and portion of trachea (long arrow). **(c)** Section following formalin fixation of the aortic arch of a green turtle infected with cardiovascular flukes. Note irregular thickness of vessel wall and focal haemorrhagic lesions (arrow heads). **(d)** Thickening of the wall of the meningeal vessels of a green turtle as result of entrapped flukes or their eggs. Bar = 10mm.

Histopathological changes

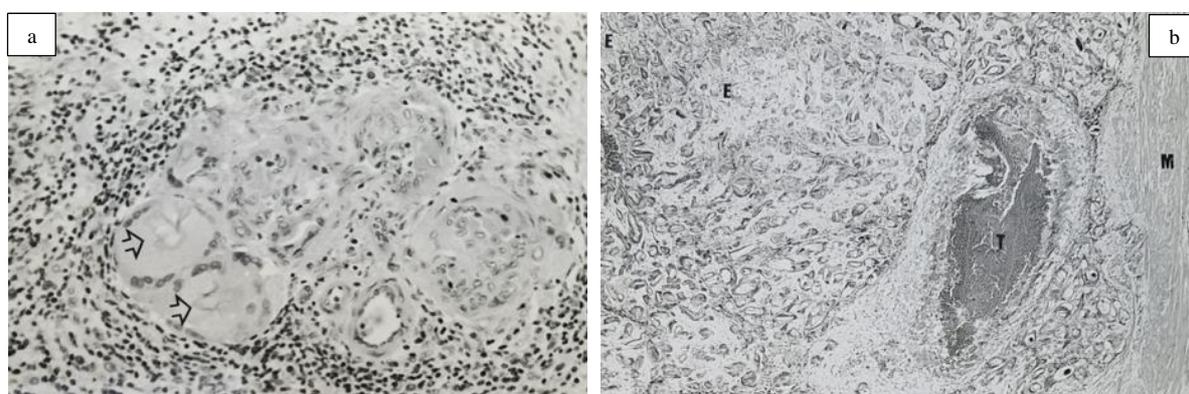
Microscopically, the prominent features of spirorchidiosis were egg granulomas, presence of fluke's endarteritis and/or perivascular cuffing, and central necrosis. In each infected turtle, single or multiple egg granulomas in different stages of development were observed in most tissues examined including brain and meninges, choroid layer of the eyes, salt-secreting glands, skin, lung, trachea, oesophagus, stomach, small intestine (including pancreas), pseudo-caecum, large intestine, liver and gall bladder, adrenal, kidney, urinary bladder, gonads, and heart and major blood vessels. A characteristic feature of granulomas was the presence of intact eggs or remnants of them surrounded by giant cells, macrophages, lymphocytes, and plasma cells after contained by a fibrous capsule (**Fig 3a**). The latter granulomas were found especially in lung, kidney, liver, and spleen. Whether granulomas were focal or multifocal depended on the organ involved, and the severity of the infection. In most organs namely heart, skin, kidney, urinary bladder, gonads, trachea, and oesophagus, focal granulomas associated with a solitary intact or disintegrating fluke egg were common. In spleen, lungs, gut, choroid layer of the eye, brain, and major blood vessels, however, multifocal granulomas, which were associated with numerous eggs (**Fig 3b**) were more frequent and were observed not only in the intima of blood vessels, but also scattered within their vasa vasorum. In the meningeal vessels and within the parenchyma of the brain, presence of numerous eggs and/or adult flukes (**Fig 3c**) sometimes elicited hemorrhages.

Adult flukes (intact or disintegrating) were also frequently encountered in sections (**Fig 3d**). In order of decreasing prevalence, they were found within blood vessels of the brain (64 of 79 examined - 81%), gut (86 of 212 - 40.6%), salt-secreting gland (18 of 54 - 33.3%), heart (49 of 201 - 24.4%), spleen (49 of 219 - 22.4%), kidney (33 of 185 - 17.8%), lungs (33 of 217 - 15.2%), adrenal (29 of 209 - 13.9%), and liver (25 of 193 - 13%). In the brain, flukes were especially present in the meningeal vessels (64 of 64 - 100%), and much less often (9 of 64 - 14.1%) were they found to penetrate into the arterioles of the brain parenchyma. In the

gastrointestinal tract, flukes were of comparable prevalence in all regions such as the stomach (64 of 86 - 74%), small - (56 of 86 - 65%), and large intestines (58 of 86 - 67.5%). In all of these sections, blood vessels of the submucosa and beneath the serosa seemed to be the most common sites. In the heart, flukes were usually buried between myocardial fibres. Blood vessels in the medulla (16 of 18 - 88.9%) of salt-secreting glands were more likely to be the sites of flukes than vessels in the cortex (4 of 18 - 22%). In kidney and adrenal however, flukes were mostly observed in the cortical blood vessels (25 of 33 - 75%, 25 of 29 - 85%, respectively) rather than in the medulla (15 of 33 - 45.8% and 6 of 29 - 20%, respectively). In the spleen, arteries in the trabeculae were the sites of the flukes, and in the lungs, arteries adjacent to large bronchi were the most frequent site where flukes were found. On two occasions, however, disintegrating flukes were within capillaries of the interalveolar septa. Of 25 specimens with flukes in the liver, 23 had flukes within the veins of portal area. In one case, flukes encapsulated by fibrous tissue, macrophages, and pseudo-palisaded giant cells, were on the capsule of the liver, adjacent to fluke migration tracts and necrotic debris that were also surrounded by fibrous tissue, macrophages, and giant cells.

Granulomas in which neither eggs nor flukes could be demonstrated were often observed surrounding a zone of central necrosis, which in turn contained flukes or persistent remnants of them, such as rod-shaped disintegrating vitellaria or sperm of the flukes.

Because of shrinkage and distortion of flukes and/or their eggs during histological processing, their generic identification based on morphology was seldom possible. Presence of a golden-brown egg with an elongated tail, or of a spined cuticle, however, justified their identification as *Laredius sp* and/or *Hapalotrema sp*, respectively.



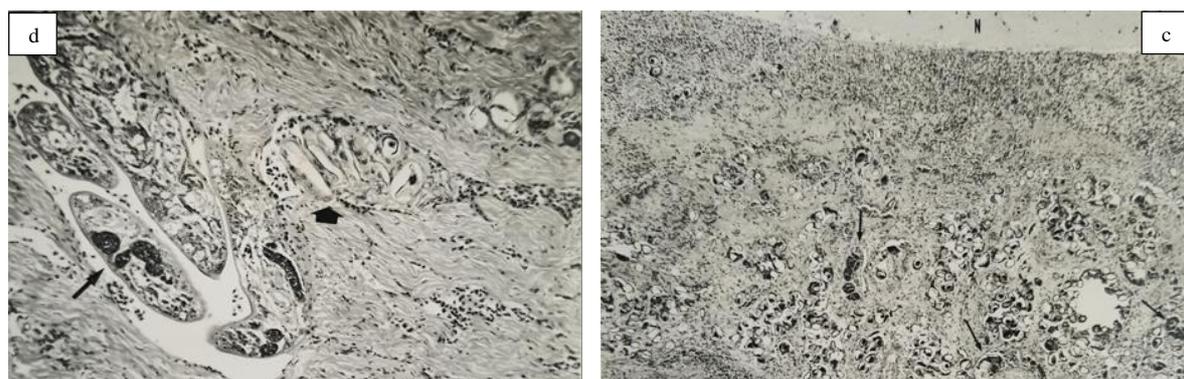
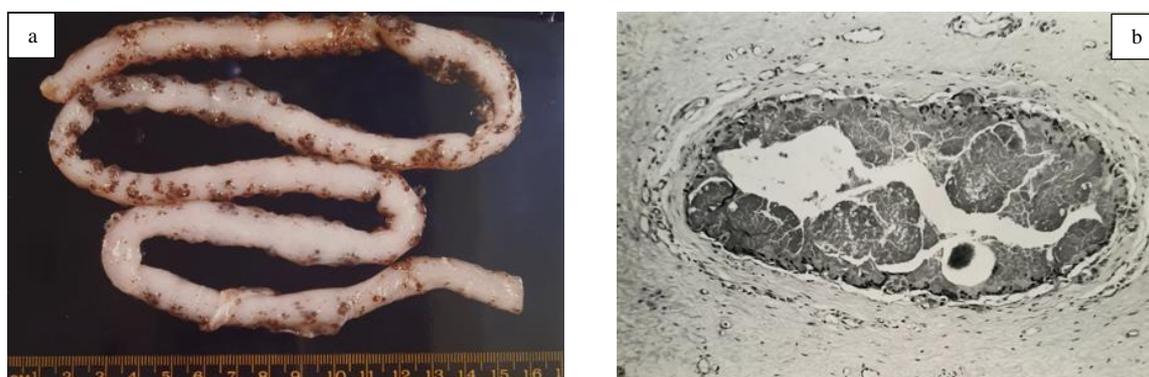


Fig 3: Histopathology spirorchidiosis in the heart, blood vessel, and meningen.

(a) A typical granuloma associated with blood fluke infection. Note the disintegrating remnants of fluke egg(s) (arrows) within multinucleated giant cells and surrounding mononuclear cells. Haematoxylin and eosin x275.

(b) Microscopic appearance of lesions shown in **Figure 2a**. Note muscularis of the vessel (M), numerous eggs (E), and central necrosis (T) which was probably the tract of a fluke. Haematoxylin and eosin x48. (c) Severe meningeal lesions associated with spirorchid infection. Note normal brain parenchyma (N) and the lodgement of remnants of adult flukes (arrows). Haematoxylin and eosin x45. (d) Adult flukes (long arrow) and formation of their eggs (short arrow) in the heart muscle of a green turtle severely infected by blood flukes (Digenea: Spirorchidae). Haematoxylin and eosin x 114.

Another interesting feature that was probably associated with this infection was the presence of nodules within the serosa and/or muscularis of the gut in a total of 123 *C mydas* and 12 *E imbricata* examined (**Fig 4a**). These nodules were white or darkly pigmented and fibrotic, measuring about 0.4 to 0.6 cm in diameter. They were most frequently observed in the small intestine, followed by the stomach and then large intestine. Microscopically, nodules consisted of a thick fibrous wall surrounding necrotic debris (**Fig 4b**). Sometimes fragments of eosinophilic cuticle-like material, and sperm-like particles resembling those in the tegument and testes, respectively, of the flukes, were observed within lesions. Raised, darkly pigmented linear lesions, measuring about 2 - 8 cm long and 0.3 x 0.5 cm wide were occasionally observed within or beneath the mucosa of the large intestine of a total of nine *C mydas* and one *E imbricata* (**Fig 4c**). Microscopically, these lesions were seen to consist of masses of fluke eggs (**Fig 4d**).



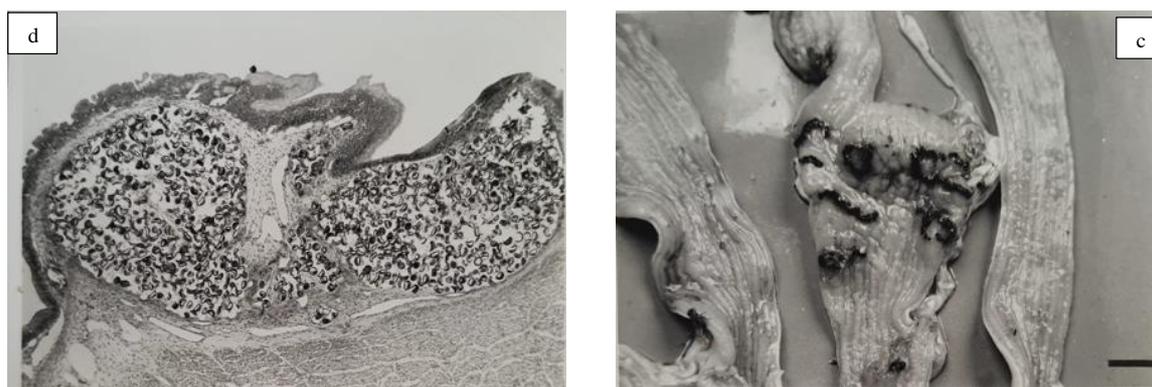


Fig 4: Gross and microscopic pathology blood fluke in the gastrointestinal.
(a) Multiple dark-pigmented intra-serosal nodules in the intestine of a green turtle severely infected by blood flukes. (b) Microscopic appearance of a nodule as shown in **Figure 4a**. A granulomatous reaction and a ring of fibrosis surrounds necrotic debris, which probably indicates the tract of the fluke. Haematoxylin and eosin x 114. (c) A raised darkly pigmented linear swelling in the mucosa of pseudo-caecum of a green turtle. Bar = 12 mm. (d) Microscopic appearance of lesion shown in **Figure 4c**. Note masses of eggs entrapped in the submucosa of the pseudo-caecum. Haematoxylin and eosin x45.

Infection of flukes other than spirorchids

Prevalence and the level of infection

As is in the heart and associated blood vessels, flukes were also consistently found (134 of 134 - 100%) in all parts of the gastrointestinal tract such as stomach, small intestine, and the large intestine. In the urinary and gall bladders, however, their prevalence was 39.6% (53 of 134) and 47.8% (64 of 134), respectively.

Various kinds of flukes (**Table 6**) and a wide range in the level of infection (**Table 7**) in each organ was found. The highest number was in the large intestine (200 ± 397), followed by the stomach (120 ± 196), small intestine (61 ± 92), gall (16 ± 18), and urinary bladders (8 ± 15).

Table 6: Prevalence of flukes in the gastrointestinal tract, gall, and urinary bladders of a total of 134 *C mydas* in Indonesia.

Organs	Family	Genera	Prevalence
Stomach	Pronocephalidae	not determined	134/134
	Microscaphiidae	not determined	42/134
Small intestine	Pronocephalidae	not determined	44/134
	Microscaphiidae	not determined	134/134
	Angiodictyidae	not determined	9b/134
	Rhytidodiidae	not determined	17/134
	Microscaphiidae	not determined	122/134
Large intestine	Angiodictyidae	not determined	134/134
	Paramphistomiidae	not determined	88/134
	Rhytidodiidae	not determined	19/134
	Pronocephalidae	<i>Pyelosum</i>	50/134

Gall bladder	Gorgoderidae	<i>Plesiochorus</i>	5/134
	Rhytidodidae	<i>Rhytidodoides</i>	64/134
	Telorchiidae	<i>Orchidasma</i>	20/134
	Unidentified	Unidentified	3/134

Table 7: Mean number of flukes found in a total of 134 green turtles in Indonesia, in relation to the organs where they were observed (except the heart and associated blood vessels).

Organs	Mean	SD	Minimum	Maximum	N
Stomach	120	196	10	1253	134
Small intestine	61	92	10	567	134
Large intestine	200	397	20	2726	134
Urinary bladder	8	15	1	81	53*
Gall bladder	16	18	1	84	64*

* Total *C mydas* with flukes

Pathological changes possibly associated with flukes other than spirorchids

Apart from petechial haemorrhages, there were no obvious pathological changes associated with flukes other than spirorchids. Such haemorrhages were mostly observed in the gastrointestinal tract (**Fig 5a**), in which its prevalence was 30.4% (41 of 134). Petechial haemorrhages were more frequently observed in the stomach (24 of 134 - 17.9%) than in the large intestine (14 of 134 - 10.4%) or small intestine (3 of 134 - 2.2%). Petechial haemorrhages were also occasionally found in the urinary bladder (**Fig 5b**) or the gall bladder; prevalence in those organs were 9.4% (5 of 53) and 4.7% (3 of 64), respectively. Presence of petechial haemorrhages in the gut, gall, and urinary bladders did not appear to be related to total numbers of flukes in that organ (**Table 8**).

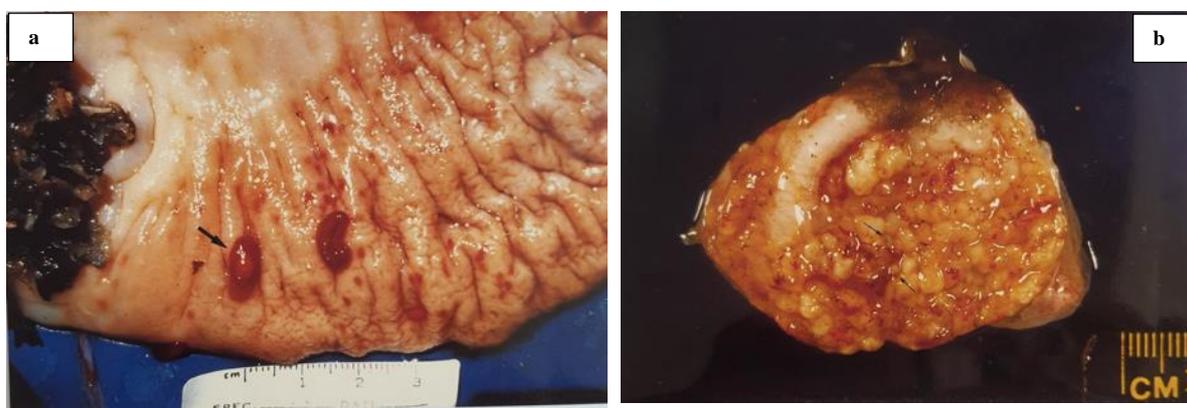


Fig 5: Pathological changes associated with flukes other than spirorchids.

(a) Petechial haemorrhages in the mucosa of the stomach of a green turtle, presumed to be due to infection with pronoccephalids which are engorged with blood (arrow). (b) Petechial haemorrhages in the mucosa of the urinary bladder of a green turtle, possibly associated with pronoccephalids infection (arrows). Note the multi-nodular appearance of the mucosa, which is normal in sea turtles.

Table 8: Prevalence of petechial haemorrhage in the gut, gall, and urinary bladders, presumed to be associated with flukes in marine turtles in Indonesia.

Organs (and number of flukes present)	Prevalence (%)		Range of total number of flukes per turtle	
			In those with petechiae	In those without petechiae
Stomach (134)	17.9	(24 of 134)	18 to 1197	10 to 1253
Small intestine (134)	2.2	(3 of 134)	10 to 567	11 to 440
Large intestine (134)	10.4	(14 of 134)	20 to 1355	20 to 2726
Gall bladder (64)	4.7	(3 of 64)	15 to 81	1 to 84
Urinary bladder (53)	9.4	(5 of 53)	14 to 52	1 to 81

Correlation between fluke burdens with bodyweight/CCL ratio, and some blood variables

Significant negative correlations with high correlation coefficients (Table 9) were found between the total number of CVF and: red blood cell count ($r_s = -0.55$, $P = 0.001$), packed cell volume ($r_s = -0.56$, $P = 0.001$), and haemoglobin concentration ($r_s = -0.64$, $P = 0.001$), indicating that the presence of heart flukes was associated with some degree of anaemia.

Table 9: Relationships between total cardiovascular flukes (CVF) or total other flukes (non-CVF), with bodyweight/CCL (B/C) ratio, red blood cell (RBC) count, packed cell volume (PCV), and haemoglobin concentration [Hb] in green turtles in Indonesia.

Parameters	Spearman correlation coefficient (r_s)	Significance (P value)
Total CVF and B/C ratio	-0.21	0.050
Total CVF and RBC	-0.55	0.001
Total CVF and PCV	-0.56	0.001
Total CVF and [Hb]	-0.64	0.001
Total non-CVF and B/C ratio	0.12	0.078
Total non-CVF and RBC	0.17	0.193
Total non-CVF and PCV	0.07	0.124
Total non-CVF and [Hb]	0.14	0.143

Application of the Bivariate Spearman Correlation test revealed that the total number of flukes present in places other than the heart and adjacent blood vessel were correlated neither with blood parameters (RBC, PCV, or Hb) nor bodyweight/CCL ratio (Table 9). This emphasizes the important of blood flukes in the general health status of marine turtles.

IV. Discussion

The first report on cardiovascular flukes (Digenea: Spirorchiidae) infection in green and hawksbill turtles in Indonesia is provided. Five genera namely *Learedius*, *Hapalotrema*, *Neospirorchis*, *Amphiorchis*, and *Monticellius* were identified in *C mydas* and *E imbricata*

captured from 11 widely dispersed capture sites, representing a wide geographical range. The large number of samples examined, provided abundant and presumably unbiased evidence that cardiovascular fluke infection is widespread in wild sea turtles in Indonesia. The fact that the prevalence of trematodiasis in both species (*C mydas* and *E imbricata*) was 100%, in which their presence was significantly correlated with certain blood variables, may be of particular importance in view of the endangered status of these species and increasing human encroachment on their habitat in Indonesian waters. The association between total spirorchids found within the heart chamber and adjacent blood vessels with the presence of vascular lesions in the aortic and brachiocephalic arches, and the discovery of a mixed infection composed of two to four genera of flukes both in *C mydas* and *E imbricata* in the present study appear to be new findings. Presence of flukes other than spirorchids did not seem to be significantly correlated with the general health status of the green turtles, as reflected by some blood variables and bodyweight/CCL ratio.

Spirorchidiasis in the present study was diagnosed with confidence, as it was based not only on histopathology, but also on direct observation of flukes in the heart and adjacent major blood vessels. The prevalence of the CVF infection in wild *C mydas* and *E imbricata* in Indonesia (100%) was higher than that reported in wild sea turtles in other regions such as Puerto Rico (25%)³¹, Florida (33%)¹², Bermuda (55%)¹³, Australia (72%)¹¹, Italy (17,5 – 33,3%)²⁴, and Hawaii (90%)²³. Other workers in Hawaii³², who used an ELISA to detect the presence of blood flukes in green turtles, found a prevalence of 80%. One or a combination of the following reasons might explain the higher prevalence in Indonesia. First, transmission of the disease was probably more efficient under tropical conditions in Indonesia. For example, *C mydas* in some habitats such as near Bunaken in the southeast Celebes feed predominantly on sea grasses such as *Thalassia hemprichii* and *Enhalus acoroides*³³, which are known to support large populations of marine gastropods. The significant differences in ELISA-Ab titre among various groups of green turtles from different geographical regions has been reported in Hawaii³². A second explanation may be differences in the methods of diagnosis. Whereas in Australia and Hawaii the workers searched visually for flukes in the heart and associated blood vessels^{11,12}, the heart and associated blood vessels did not wash to dislodge the flukes as was the practice in the present study. Some flukes, especially those belonging to the genus *Learedius* are very small and are not detected on gross examination, particularly if any blood clots remain in the heart. Thus, diagnosis based solely on visual observation with the unaided eye is inaccurate. Other workers, who grossly examined squashed preparations of brain, liver, kidney, or spleen, scrapings of intestinal wall, or fixed mesenteric vessels in an attempt to find

adult spirorchids and/or their eggs^{12,13}, did not confirm the presence of flukes in the heart or associated blood vessels. As the predilection site of spirorchids is within the heart chamber, searching for these flukes in places other than the heart must result in a lower prevalence being recorded.

The use of ELISA provides a new approach to the detection of the blood flukes in marine turtles²⁴, particularly as this technique can be applied to live turtles. However, as the life cycle of these flukes has not yet been defined, caution in interpretation of results is needed. The cut-off value of any negative control using captive-reared turtles must be carefully defined, as they may also be infected^{11,17}, though perhaps at a low level. Another consideration is, that the prevalence survey of spirorchid infection conducted in Hawaiian green turtles used only three genera of blood flukes viz. *Carettacola*, *Hapalotrema*, and *Learedius* as sources of antigen³², so that other genera present might not be detected. It has been known that there are at least eight genera of spirorchids are harboured by marine turtles¹¹.

A third possible explanation for the different in fluke prevalence is the condition of turtles examined. Results on prevalence of CVF reported so far were mostly based on the examination of turtles found dead which may thus have autolyzed before being necropsied^{12,13}. Examination for flukes in the present study was always conducted immediately after turtles were killed.

In the present study, the level of infestation of heart flukes in *C mydas* was higher than those found in *E imbricata*. Host size, and presumably age seemed unlikely to be the cause of difference in this study; as most hawksbills examined were immature, they could be expected to harbour more flukes rather than the green turtles that were mostly mature. Difference in habitat of these two species may explain the contrasting fluke prevalence. Whereas *C mydas* is a herbivore that feeds mainly on sea grasses and algae³⁴, *E imbricata* is considered an omnivore that feeds particularly on coral reefs and rocky outcrops^{35,36}. However, whether the intermediate host(s) of the heart flukes is more abundant in the *C mydas* feeding ground rather than in *E imbricata* feeding areas needs to be explained.

The intensity of infection of heart flukes in infected turtles found in this study was comparable to those reported from *C mydas* in the Great Barrier Reef, Australia¹¹, but higher than those reported from Bermuda¹³ or Hawaii²¹. As in regard to prevalence, factors such as local environment, methods of diagnosis, and condition of turtles examined probably explain the varying severity of infection.

An interesting finding in the present study was that in *C mydas*, the CVF burden decreased with increasing size, and presumably age of turtles. Smaller turtles, ie those with a CCL up to 60 cm were found to harbour more flukes than those with a CCL between 61 cm

and 122 cm. The reason for this phenomenon is not clear, but the development of an immune response might be involved. The first contact of *C mydas* with snails is probably during the post-hatchling period, when the young turtles occupy open ocean pelagic habitats. This was indicated by the finding that the stomach of a post-hatchling *C mydas*, removed from the stomach of a shark caught near Durban, South Africa, was filled with the pelagic snail *Janthina janthina*³⁷. Whether this snail is an intermediate host for CVF, is unknown. More intensive contact between green turtles and the suspected snails probably occurs when they arrive at benthic foraging areas, where they begin feeding on seagrasses and algae. It has been suggested that marine gastropods were known to be well supported by these two floras¹¹. It seems likely that this enhanced contact between the turtle and the parasite might stimulate an immune response against the flukes. Turtles in general, are reported to have a capability to form antibody and immunological memory when they are challenged with diverse soluble and particulate immunogens³⁸.

Two genera namely *Learedius* and *Hapalotrema* were the most prevalent spirorchids in green and hawksbill turtles. This finding was comparable to those reported in the Cayman Islands¹⁷, Bermuda¹³, North Queensland, Australia¹¹, Hawaii²³, and Puerto Rico^{31,39}.

Dual infection with these flukes in the one host was reported in north Queensland, Australia¹¹ and in Hawaii²³ who also observed concurrent infections with three genera (*Learedius*, *Hapalotrema*, and *Carettacola*) in *C mydas*. In the present study however simultaneous infection of turtles with four genera of spirorchids was found. Given the complexity of life history of sea turtles and the varied marine environment in which they live, these findings were not surprising. Marine turtles are known to migrate extensively, thus enhancing the possibility of infection with several or more flukes. However, as there is no indication about what species of snail might be the intermediate host, research in regard to this aspect is paramount.

Pathological changes associated with blood fluke infection in this study are comparable to those previously reported^{11,12,13,17}. Importantly, however, in the present study, the severity of lesions in the brain and aortic arch ie aneurisms and thickening and hardening of arterial walls – sometimes accompanied by thrombosis, seemed to be related to the number blood flukes recovered from the turtle. This might explain why such severe lesions were seldom observed by other workers who noted fewer parasites. Except for several heavily infected (average of 36 flukes per turtle) wild *C mydas* in Australia¹¹ in which the fluke burdens were high (between 23 - 167), these lesions so far have not been reported in sea turtles from other countries, nor in farmed or oceanarium-reared green turtles harbouring up to six and 23 flukes,

respectively⁴⁰.

A total of 35 turtles (55.6% of those in which brain was examined) was observed to have spirorchidiosis with severe brain involvement. Haemorrhages associated with the lodgement of flukes and/or their eggs in the meningeal vessels and within the brain parenchyma, was, again, correlated with the number of flukes found within the heart and adjacent blood vessels (at least 60 flukes per turtle). Spirorchidiosis with brain involvement has been reported in wild and oceanarium-rear green turtles from Australia^{10,11}, but the brain lesions observed did not seem to be as severe as in the present study.

Cysts (Nodular granulomas) adjacent to but distinctively separate from arterial aneurisms were another interesting finding in this study. Microscopically, these Nodular granulomas cysts contained flukes and/or eggs morphologically similar to those within the heart, so it seems likely they might indicate ectopic spirorchid infection. The means by which the blood flukes and/or their eggs escape from the blood vessels is, however, undetermined.

Another lesion observed in this study that apparently has not been reported previously was the presence of multiple darkly pigmented nodules in the muscularis and/or serosa of the stomach, small, and large intestine. Although the presence of eosinophilic cuticle-like material, resembling that found in the tegument of the flukes suggested these lesions were associated with flukes, it was not determined whether it was solely associated with spirorchid or other flukes.

The consistent finding of a large number and variety of trematodes other than spirorchids probably suggests that such flukes are unlikely to affect the general health and survival of the green turtles in Indonesia adversely. This was suggested by the finding of no significant correlations between the total numbers of these flukes with bodyweight/CCL ratio and some blood variables such as RBC, PCV, and Hb. A further detailed study on the species of flukes associated with petechial haemorrhages in the gut, gall, and urinary bladder need to be done.

Spirorchid infection, especially when severe and involving in excess of, for example, 60 flukes per turtle, is clearly a major problem in marine turtles in Indonesia. Anaemia as indicated by negative correlations between spirorchid burden and bodyweight/CCL ratio, and erythrocytes parameters such as RBC, PCV, and Hb, is an obvious consequence of this disease in marine turtles. Lodgement of adult flukes and/or their eggs in almost all tissues examined, particularly the brain, heart, lungs, spleen, and liver, is clearly threatening the life of the turtles.

V. Conclusion

The prevalence of spirorchidiasis in both *C mydas* and *E imbricata* were 100%, involving flukes of six genera of the family Spirorchiidae in *C mydas*, and four genera in *E imbricata*. A single, or multiple species could be found in a turtle, with the intensity of infection varied between 9 -197 flukes per turtle. Depending on the intensity of infection, the pathological effects associated with cardiovascular flukes included anaemia, hydropericardium, hydroperitoneum, thickening and hardening of arterial walls. Microscopically, egg granulomas, presence of flukes, endarteritis and/or perivascular cuffing, and central necrosis were prominent. Other flukes were also consistently found (100%) in all parts of the gastrointestinal tract, 40% in urinary bladder, and 48% in gall bladder. The total number of flukes present in the places other than the cardiovascular system were correlated neither with blood parameters nor bodyweight/curved carapace length ratio. Findings in this study indicated that cardiovascular fluke infection is a major problem in marine turtles in Indonesia, with anaemia and lodgement of adult flukes and/or their eggs causing life threatening illness.

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An analysis of clinical waste management system in a tertiary care hospital

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Abstract

Waste generation is un-avoidable in Hospital, 85% is general waste and remaining 15% is hazardous materials. Types of wastes generated are infectious waste, pathological waste, sharps waste, chemical waste, pharmaceutical wastes, cytotoxic wastes, radioactive wastes, non-hazardous or general waste. Life Cycle Approaches (cradle to grave) of waste management are waste avoidance, waste minimization, segregation, collection, transportation, storage, treatment and disposal. A qualitative study was done to analyze the waste management at a tertiary care hospital in Sri Lanka. High-income countries generates hazardous waste on average up to 0.5 kg of per hospital bed per day, while the average hazardous waste generation in low-income countries is 0.2 kg per bed per day, whereas in this study waste generation was 0.276 kg per bed per day. Results showed that the waste management is done in the hospital according to standard procedures. On conclusion it was recommended to use standard operation procedures, guidelines and protocols for health care institutions in waste management.

Key words: Health Care Institution, Waste Management

Introduction

Waste generation is an un-avoidable event in a Hospital. According to the World Health organization health-care activities generate about 85% is general wastes out of the total amount of waste which is non-hazardous waste and it is comparable to domestic waste and remaining 15% of waste is considered as hazardous material that may be infectious, chemical or radioactive [1]. There can be many health hazards and environmental impacts due to waste produced in the health care institutions, if it is not managed properly.

Types of Wastes

Types of wastes and by-products produced in the health care institutions covers a diverse range of materials, and they are as the follows [1]. **Infectious waste** can be describes as the materials that are contaminated with blood and other bodily fluids (e.g. from discarded diagnostic samples), waste from patients (e.g. swabs, bandages and disposable medical devices) or cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories). **Pathological waste** namely human tissues, body parts, organs or fluids and contaminated animal carcasses. **Sharps waste** are syringes, needles, disposable scalpels and blades, etc. **Chemical waste** are the solvents and reagents used for laboratory preparations, sterilants, disinfectants and heavy metals that contained in medical devices (e.g. mercury in broken thermometers) and batteries. **Pharmaceutical wastes** are expired, unused and contaminated drugs and vaccines. **Cytotoxic wastes** are substances with genotoxic properties (i.e. highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), which are cytotoxic drugs used in cancer treatment and their metabolites. **Radioactive wastes** which are products contaminated by radio-nuclides including

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radioactive diagnostic material or radio-therapeutic materials, and **Non-hazardous or general** waste that does not pose any particular biological, chemical, radioactive or physical hazard [1].

The major sources of health-care waste are from hospitals and other health care facilities, research centres and Laboratories, autopsy centres and mortuary, animal research, testing laboratories, blood banks and collection services, and from nursing homes for the elderly.

According to the literature high-income countries on average generates hazardous waste up to 0.5 kg of per hospital bed per day, while low-income countries generate on average 0.2 kg per bed per day. However, health-care waste is not often segregates into non-hazardous or hazardous wastes in low-income countries making the real quantity of hazardous waste much higher [1].

Health risks

Health-care waste which contains potentially harmful microorganisms could infect hospital patients, health workers and the general public. Drug-resistant microorganisms which spread from health facilities into the environment are the other potential hazards. Adverse health outcomes associated with health care waste and by-products includes [1], Sharps-inflicted injuries, Toxic exposure to the pharmaceutical products, particularly antibiotics and cytotoxic drugs which are released into the surrounding environment, and to substances such as dioxins or mercury, during the handling or incineration of health care wastes. Chemical burns arising in the context of sterilization, disinfection or waste treatment activities. Whereas the air pollution arise as a result of the release of particulate matter during medical waste incineration, and thermal injuries can occur in conjunction with open burning and the operation of medical waste incinerators, and radiation burns. It is estimated 16 billion injections are administered every year worldwide. It creates a risk of injury, infection and accidental reuse due to all needles and syringes are not disposed safely,.

Environmental Impact

Treatment and disposal of healthcare waste may pose health risks indirectly through the release of pathogens and toxic pollutants into the environment. If those landfills are not properly constructed, the disposal of untreated health care wastes in to these landfills can lead to the contamination of drinking, surface, and ground waters. The treatment of health care waste with chemical disinfectants can result in the release of chemical substances into the environment, if those substances are not handled or disposed properly. Widely practiced method of waste disposal is the incineration of waste. But inadequate incineration or the incineration of unsuitable materials results in the release of pollutants into the air and in the generation of ash residue. Incinerated materials which contained or treated with chlorine can generate dioxins and furans, which are human carcinogens and also associated with a range of adverse health effects. Incineration of materials with high metal content or incineration of heavy metals (particularly lead, mercury and cadmium) can lead to the spread of toxic metals in the environment.

Waste Management Principles

Waste hierarchy [2] is waste reduction, reuse, recycling, energy recovery, and disposal. Life Cycle Approaches (cradle to grave) [3] are waste avoidance, waste minimization, segregation, collection, transportation, storage, treatment and disposal. National color code used in Sri Lanka are Green for Bio-degradable wastes, Red for glasses, Orange for plastics, Blue for papers, and Brown for metals and Yellow color for clinical wastes and Yellow cover with red band for sharps. Type of waste and method of management [4] are as follows. Bio- Degradable Waste are manage with composting and Bio- gas generation, Plastic / Polythene Waste are manage with Recycling and Fuel generation, Glass & Metal are Recycled. Clinical wastes are incinerated, autoclaved, metamized, or chemical treatment is done.

Methodology

Objective of this study is to analyze clinical waste management system in tertiary care hospital. Study setting was a National level tertiary care hospital in Sri Lanka. The selected National level tertiary care health care institution has a Bed Strength of 3200, average bed occupancy rate was 78%, average length of stay was 3.5 days and average turnover was 20.09. This was a qualitative study. Methods used were Key Informant Interviews and Observation to gather data. Key Informant Interview were done with, Medical Officer Planning of the Hospital, Hospital Secretary, Infection Control Unit Sister and Nurses, selected ward sisters from selected Medical wards, surgical wards, ICUs, Operation Theaters, Minor staff responsible for waste management at the ward level, In-charge at the waste collecting and storage section and Cleaning staff (sanitary labors). Observation was done in hospital wards and units to observe practices, waste segregation, and storage. Observations were done for waste transportation, waste storage at central level and waste disposal from the hospital.

Results

Results were obtained according to the waste management cycle of waste generation, waste collection and segregation, waste transportation, waste storage and waste Disposal.

Wastes were generated from medical and surgical wards, Intensive Care Units, Operation Theaters, Laboratories, Radiology Department, Pharmacy etc. All types of wastes were generated. This study was focused mainly on the clinical waste. The clinical wastes are generated from the above mention sections. On findings surgical wards and operation theaters generate more clinical wastes compare to other units. Types of wastes generated were Swabs, Gauze, Naso-Gastric tubes, Intravenous Venous lines, contaminated saline bottles, Sharps, Needles, Cannulas, Urinary Catheters, Urinary Bags, Blood Body fluids, Blood Spills, Pathology samples, Lab Disinfected Chemicals, Radioactive chemicals, Endo-Tracheal tube, Orthopedic remnants like Blunt & Sharps, Lab waste, Culture media, Pharmaceuticals.

Waste segregation done properly and collection of waste was done according to the color codes. Green bins were used to collect Bio-degradable wastes, Yellow bin collected clinical wastes, Blue bins collect papers, Red bin collect glasses, Orange bin collected plastic Brown bin collected metal Yellow and red strips bins collected Sharps while Black bin collected other type of wastes.

Waste transportation within the hospital was done by a cart, or trolley. There is a responsible person for transportation and supervision. Transportation takes place three times a day. Culture medias were disinfected before transportation. Supervision is done by ward sister and cleaning supervisor at the wards and unit level.

There was a dedicated place for storage facilities at the Hospital premises. Generated amount of wastes are as follows. General waste was 5,100 kg per day, clinical waste was 822 kg per day, sharps were 63 kg per day and plastic waste generation was 12 kg per day. At the final storage in the hospital it is supervised by expert staff. There were color coded compartments to store wastes at wards and unit levels and also at the final storing complex in the hospital.

General waste was taken by the municipal council and clinical waste was given to a private company. The clinical wastes are incinerated by the private company. The culture media is autoclaved before it is disposed as a clinical waste. Pathological samples and body parts are disposed to a cemetery. Glasses, papers, plastics are taken by a private company for recycling.

Waste management monitoring and evaluation was done by the, Infection Control Committee that responsible for the Clinical waste management in the Hospital. There were two Microbiologists who overlook the waste management system in the hospital. These Microbiologists overlook the infection control unit in the hospital. Infectious control unit was comprised of one Sister and ten Infectious Control Nursing officers (ICNO). Each ward and unit had a liaison nursing officer for the waste management. ICNO and liaison nursing officers meetings were conducted monthly.

Some negative factors identified in the study were as follows. The awareness about segregation was poor in few wards. Also, there was poor contribution from the all the staffs (Medical Officers, Nurses, Minor staff) and cleaning service for waste management in few wards and units. It was identified that, poor contribution from the patients and the by standers for waste segregation in several units. Although these negative factor identified infection control unit and the health education unit already has taken steps to address these issues.

Discussion

As in the other health care setting similar types of wastes were generated and the waste generation was similar too. According to the literature hazardous waste in high income countries produces 0.5 kg per bed per day whereas in low income countries 0.2 kg per bed per day is produced. In this study 0.276 kg per bed is produced ($822 + 63 = 885/3200 = 0.276$). Sri Lanka is a middle income country, waste production in this study is 0.276 which is between high income country and low income country, but the figure is more towards the low income country. Waste segregation, transportation, storage and disposal in this study done according to the standards describes in the literature.

Conclusion

The hospital in this study carries out satisfactory waste management system in the hospital. This study showed few gaps which was addressed immediately. Based on this study following recommendation will further help to improve the waste disposal system in a Health Care Institutions.

Recommendations

- Health care institutions should have standard operation procedures to manage waste generated at their institutions. These standard operation procedures should be functioned at every level of the health care institutions. Guidelines and protocols on these procedures should available to the staff
- Health care staff should possess a sound knowledge on waste management and they should also possess good attitudes. Therefore they need regular updates and motivation on standard method of waste management by capacity building (training, workshop, lectures etc.).
- A monitoring and evaluation plan and a system, regular audits will help the process of waste management in health care institutions.

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Comparison of Capox and Folfox with or Without Irinotecan in Colorectal Cancer

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Abstract- Colorectal cancer is cancer that occurs in the rectum or colon. Colon cancer and rectal cancer are often put together because they have many similar features. Colorectal cancer is one among the most common type of cancer and is also third in cancer-related mortality. Currently, Capecitabine and Oxaliplatin (CAPOX) and 5-fluorouracil, Leucovorin, and Oxaliplatin (FOLFOX) are one of the conventional adjuvant treatments of colorectal cancer. The aim of this study is to study the efficacy and safety profile of CAPOX (Capecitabine and Oxaliplatin) and FOLFOX (5-FU, Leucovorin and Oxaliplatin) along with or without the addition of Irinotecan. **Result:** A total of 158 subjects who received either CAPOX or FOLFOX were analyzed. Of these 158 subjects who were enrolled based on the inclusion and exclusion criteria, the percentage of subjects receiving FOLFOX was 62.6%, the percentage of subjects receiving CAPOX was 19.6%, and the percentage of subjects that received both CAPOX and FOLFOX was 17.7%, Also 20.2% of patients received irinotecan following administration of FOLFOX, 29% of patients received irinotecan following administration of CAPOX **Conclusion:** FOLFOX regimen was preferred than CAPOX in all age groups, including geriatric patients. Both these agents showed several adverse effects, but the ADR's associated with CAPOX is comparatively higher than with FOLFOX, and also ADR's were much higher when both these regimens were combined. Irinotecan is mostly preferred in stage IV of colorectal cancer. Combination of Irinotecan with CAPOX or FOLFOX seemed to improve the overall efficacy of the chemotherapeutic agents.

Index Terms- Colorectal Cancer, CAPOX, FOLFOX, Irinotecan

1. INTRODUCTION

Colorectal cancer occurs in the rectum or colon. They are also called cancer of the colon or the rectum, depending on where they arise. Colon and rectal cancer is paired together because they have several features in common. Cancer starts when the body's cells start growing out of control. Cells can turn tumorous in any part or site of the body and spread to other body parts. Colorectal cancers begin as growth on colon or rectum's inner lining. Those cultivations are called polyps. With time, some forms of polyps can transform into cancer (usually several years), but every polyp cannot become cancer. Colorectal cancer begins in the mucosa, which is the innermost layer and may grow outward through some other layers.^[1] The high risk of developing colon and rectal cancer is due to the many studies "Westernized lifestyle," which means obesity, sedentary behavior, and foods rich in high-meat, high-calorie, and fat-rich. It was observed that dietary fat, which affects bacterial flora, influences colon cancer pathogenesis.^[2] The two most major risk factors are alcohol consumption and tobacco smoking. In the survey done, it was seen that the drinkers who consume four or more drinks daily are at higher risk for developing cancer as this directly affects the folate synthesis. Smoking has been linked with the risk of developing colorectal adenoma. This causes the cigarette carcinogens in the circulatory system and gastrointestinal tract to spread, causing colorectal mucosa, increasing the risk of mutagenesis, inflammation, and carcinogenesis.^[3] Based on the patient's health, size of the tumor, and its location. Surgery is the most treated option, and the type of surgery for cancer depends on the site of cancer cells and the extent of metastasis. Other treatment option includes radiofrequency chemotherapy, ablation, cryosurgery, targeted therapy, or radiation therapy. Stages I, II, and III cure, the

intention is to eradicate the micro metastatic disease. Most stage IV disease is incurable; cancer growth is managed with palliative treatment, symptoms are decreased, quality of life improved, and survival increased. Systemic Chemotherapy palliates the symptoms and enhances the survival of unresectable disease patients. RT has the potential to control localized symptoms. Most mCRCs are incurable. Accepted initial chemotherapy regimens include oxaliplatin containing regimens (FOLFOX, CAPOX), irinotecan containing regimens (FOLFIRI), oxaliplatin, irinotecan, fluorouracil and leucovorin (FOLFOXIRI), infusion fluorouracil plus leucovorin, and capecitabine. However, randomized trials suggest that chemotherapy prolongs life and improves the quality of life. Once irinotecan is administered with fluorouracil plus leucovorin as the initial therapy, tumour response rates, time to progression, and OS increase. Early-onset diarrhoea and neutropenia are irinotecan dose-limiting toxicity. Combined with infusion fluorouracil plus leucovorin, oxaliplatin leads to higher response. Capecitabine monotherapy in patients who are unable to withstand IV chemotherapy is suitable for first-line treatment. It is required for oral administration, converted to fluorouracil in combination with oxaliplatin (CAPOX), and is a suitable replacement for infusion fluorouracil.^[4]

2. LITERATURE REVIEW:

- Degirmencioglu et al. (2019)^[5]

Patients receiving CAPOX were considerably older than those receiving FOLFOX. In the FOLFOX arm, the rate of progression of disease, metastasis and mortality was significantly higher than that of CAPOX arm. The overall survival rate was not much different between the two regimens. For older patients, the CAPOX regimen is preferred, the risk of development of the disease, metastasis, and mortality in FOLFOX is higher than in CAPOX.

- Jonathan et al. (2018)^[6]

Both CAPOX and FOLFOX regimen are commonly used in the adjuvant therapy of colon and rectal cancer. Though their effects are assumed to be same they have not been compared directly. The study evaluated the toxicity profiles, survival, and RDI,

associated with FOLFOX and CAPOX regimens. FOLFOX showed increased neutropenia and mucositis, CAPOX showed increased dose-limiting toxicity (DLT), CAPOX was also associated with increased diarrhoea and hand-foot syndrome. CAPOX, however, showed enhanced disease-free survival which remained an essential factor in high-risk patients. Hence the study showed that despite higher toxicities and lower relative dose intensity, CAPOX is associated with higher disease-free survival rate.

- Sombrero et al. (2018)^[7]

The findings relied on the treatment and frequency of adjuvants. For CAPOX, three months regimen were as good as six months; for FOLFOX, an additional gain was applied to 6 months. Contrary to expectations, the low-risk patients benefited more from the six months than the high-risk group. The regimen choice and length will depend on the characteristics of the patient and the potential risk of a more lengthy procedure.

- Sánchez et al. (2018)^[8]

Fluorouracil is still considered as one of the main drugs for metastatic colorectal cancer therapy; fluorouracil plus irinotecan (FOLFIRI), fluorouracil plus oxaliplatin known as FOLFOX regimen or fluorouracil plus Capecitabine known as CAPOX regimen are considered protocols for chemotherapeutical treatments producing outcomes that are similar. Another therapy involves these chemotherapy regimens in combination with novel molecular targeted drugs like bevacizumab, cetuximab or panitumumab. These chemotherapy regimens show significant survival benefits in some patients as either first- or second-line therapies—the factors affecting the decisions for a treatment option depending on the patient and toxicity of the drug.

- Prachi et al. (2017)^[2]

The geographic variation in colorectal cancer incidence is known, and the study also shows a considerable difference in demographic and histological characteristics. India's more youthful population structure could contribute to the high number of patients presented at a young age. Further research is required into the higher number of signet ring tumours as compared to those identified in the West. Clinicians should be prepared to appreciate the significance of comprehensive family history,

considering the large number of young patients diagnosed with CRC. The management strategy will also include dietary evaluation and therapy since most CRC patients are malnourished.

- Mamo et al. (2016) ^[9]

We present a real-life experience of patients being treated at two separate institutions with either mFOLFOX6 or CAPOX in the adjuvant environment, evaluating the dose strength and toxicity and their effect on patient outcomes. Our report shows that dose reductions in the CAPOX regimen do not appear to impact clinical outcomes in real-life practice.

- McLean et al. (2016) ^[10]

Currently, FOLFOX is considered the most common first-line agent and FOLFIRI the most common second-line and third-line agent for mCRC therapy. The study showed that bevacizumab is commonly used targeted therapy. Disease progression was the primary cause of Therapy discontinuation.

- Loree et al. (2014) ^[11]

Treatment for metastatic colon cancer uses either combination therapy or monotherapy with concurrent combination therapy. Therapy that patients undergo includes intravenous 5-fluorouracil (5-FU) therapy (FOLFOX) or Capecitabine administered orally with oxaliplatin (CAPOX). The study showed that Patients medicated with CAPOX had much lower doses of fluoropyrimidine and oxaliplatin compared with patients treated with FOLFOX who had higher-grade toxicity; however, the overall clinical outcomes did not worsen.

- Alessandra P and Alberto F 2007) ^[12]

We may draw a number of conclusions based on the available data regarding second-line therapy for advanced CRC. Chemotherapy of the second-line active agent is superior to only the best supportive treatment. After a 5-FU failure, the intense regimens include FOLFOX, Irinotecan, FOLFIRI and IROX with FOLFIRI being superior to IROX. In general, FOLFOX is the best choice after first-line treatment based on irinotecan, and the FOLFOX plus bevacizumab combination seems to be superior to FOLFOX given alone. FOLFIRI and Irinotecan are the most suitable choices following a FOLFOX failure. Cetuximab plus irinotecan should be an effective regimen.

3. MATERIALS AND METHOD:

Objectives:

The main objectives of this study are

- To compare the efficacy of CAPOX & FOLFOX with or without irinotecan in colorectal cancer.
- To compare the safety of CAPOX & FOLFOX with or without irinotecan in colorectal cancer.
- To identify the efficacy and safety of different treatment regimens other than CAPOX & FOLFOX in colorectal cancer.

Inclusion criteria:

- Patients with colon and rectal cancer.
- Patients of both gender.
- Geriatric patients.

Exclusion criteria:

- Incomplete medical records.
- Below 18 years of age
- Pregnancy

	CAPOX(n=31)	FOLFOX(n=99)	CAPOX & FOLFOX(n=28)
FEMALE	8	25	10
MALE	23	74	18

- Cancers other than colon and rectal cancer.

Study period:

This study is proposed to be conducted for a period of six months.

Sample size:

The sample size is expected to be around 150-200 patients

4. RESULT:

1. GENDER

In our prospective study, a total of 158 cases were collected in six months, of which 27% (43) were female patients, and 73% (115) were male.

ADR	CAPOX(n=31)	FOLFOX(n=99)	CAPOX & FOLFOX(n=28)
Mouth ulcer	14(45.16%)	24(24.24%)	13(46.42%)
Hand foot syndrome	11(35.48%)	32(32.32%)	9(32.1%)
Anemia	14(45.16%)	50(50.50%)	12(42.85%)

2. AGE – WISE DISTRIBUTION:

Of the 158 patients that received treatment with CAPOX or FOLFOX, recording the age-wise distribution of subjects with a class size of 10 years, it was seen that majority of subjects belonged to the age group of 51-60, the mean age at the time of diagnosis was 55 years (range 25-78). In the CAPOX arm, the mean age was 55.1 years. In the FOLFOX arm, it was 53 years, and the Mean age for patients receiving both CAPOX and FOLFOX was 62 years.

3. STAGES OF COLORECTAL CANCER:

In this study, patients with stage –II, III, and IV colorectal cancer were only included. Of the 158 patients present at the time of our study, 34.2% had stage II colorectal cancer, 40.5% were in stage III colorectal cancer, and 25.3% in stage IV colorectal cancer. It was seen that in stage II and III, FOLFOX arm was more commonly preferred than CAPOX arm and in stage IV most of the patients received a combination of both CAPOX & FOLFOX.

4. TYPES OF COLORECTAL CANCER:

Of the 158 patients receiving treatment with CAPOX or FOLFOX, 36.7% were diagnosed with colon cancer, 22% were diagnosed with rectal cancer. 14% were diagnosed with rectosigmoid cancer, 3% were diagnosed with anorectal cancer, 24% of patients showed lung, liver, and bone metastasis.

5. ADVERSE EFFECTS:

Adverse effects like vomiting, pain, fatigue, Insomnia were commonly found in both CAPOX and FOLFOX arm. Other Adverse effects that were also seen in patients include mouth ulcers, hand-foot syndrome, and anaemia. Mouth ulcers were seen more in people taking a combination of CAPOX and FOLFOX and were also commonly found in patients who were administering only CAPOX. Hand-foot syndrome was mostly

seen in CAPOX arm than in FOLFOX arm. On the other hand, anaemia was seen mostly in the FOLFOX arm compared to that of CAPOX arm.

6. EXISTING COMORBID CONDITIONS:

Any comorbid conditions present among the 158 patients were recorded and analysed. Most common comorbid conditions present among patients at the time of our study include inflammatory bowel disease, hypertension, diabetes, and coronary artery disease. Other existing conditions that were found were thyroid and asthma.

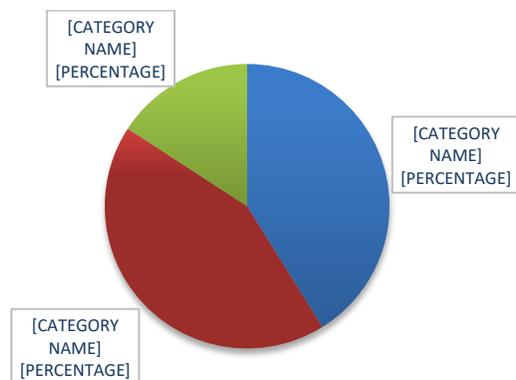
7. HISTOPATHOLOGICAL CHARACTERISTICS

Differentiation gives details of how little or how much tissue of a tumour looks like a normal cell. Well-differentiated cancer cells appear more closely like normal cells, and poorly differentiated cancer cells are likely to multiply. From the table, we can see that of the 158 cases collected, 41% of them had well-differentiated tumour cells, 43% were moderately differentiated, and 16% were poorly differentiated.

8. METASTASIS:

We found in our study that colon or rectal cancer mostly metastasizes to the lungs and liver. Of the 158 cases that were collected, 24 % showed metastasis to other regions of the body. Most of the patients diagnosed with metastatic colorectal cancer were given a combination of CAPOX and FOLFOX.

9. CAPIRI AND FOLFIRI:



In our study, 20.2% of patients received irinotecan following administration of FOLFOX, 29% of patients received irinotecan as following administration of CAPOX, and 64.2% of patients

received irinotecan following administration of both CAPOX and FOLFOX.

10. TREATMENT DURATION:

The table shows the treatment duration of CAPOX and FOLFOX during our study; the average number of completed CAPOX cycles was eight; the average number of completed FOLFOX cycles was ten. Of patients receiving CAPOX, 44 per cent did not complete the standard eight cycles; of patients receiving FOLFOX, 70 per cent did not complete the standard twelve cycles.

5. DISCUSSION:

For our study, patient data were collected from the initial diagnosis to the chart review time. These data include medical history, disease stage, and tumour pathology at the time of diagnosis, chemotherapeutic regimens, duration of therapy, and type of surgery.

The study aims to assess the safety and efficacy profile of CAPOX- Capecitabine and Oxaliplatin, and FOLFOX-5-fluorouracil, Leucovorin, and Oxaliplatin, along with Irinotecan as adjuvant treatment in patients with colorectal cancer.

In our prospective study we observed that out of 158 patients that were diagnosed with colorectal cancer, 62.6% received FOLFOX (n=99), 19.6% received CAPOX (n=31) and 17.7% received both CAPOX & FOLFOX (n=28).

Of the 158 patients diagnosed with colorectal cancer, 115(73%) were male, and 43(27%) were female. FOLFOX is more commonly given than CAPOX in both male and female patients.

Of the 158 patients that received treatment with CAPOX or FOLFOX, the mean age at the time of diagnosis was 55 years (range 25-78). In the CAPOX arm, the mean age was 55.1 years; in the FOLFOX arm, it was 53 years, and the Mean age for patients receiving both CAPOX and FOLFOX was 62 years.

Degirmencioglu et al. [5] conducted a study that showed that Patients who received CAPOX were older than those who were administered FOLFOX; however, in our study, we found that in most of the older patients a combination of both CAPOX and FOLFOX were received. (p=0.005)

We excluded patients with stage 0 and stage I colorectal cancer for our study because CAPOX and FOLFOX are not commonly preferred in the early stages of colorectal cancer; hence we only included patients with stage –II, III and IV colorectal cancer. Of the 158 patients present at the time of our study, 34.2% had stage II colorectal cancer, 40.5% were in stage III colorectal cancer, and 25.3% in stage IV colorectal cancer. We found that in stage II and III, FOLFOX arm was more commonly preferred than CAPOX arm, and most of the patients with stage IV of colorectal cancer received a combination of both CAPOX & FOLFOX.

Adverse events profile of FOLFOX and CAPOX regimens varies greatly among previous studies; Mamo et al. [9] reported that nausea and diarrhoea were more common in FOLFOX arm than in CAPOX arm. Loree et al. [11] found that diarrhoea and hand-foot syndrome were more frequent in CAPOX, Degirmencioglu et al. [5] found that hand-foot syndrome is more common in CAPOX arm than in FOLFOX arm. Nausea and diarrhoea were common in both arms. In our study, mouth ulcer and hand-foot syndrome were more common in CAPOX arm than in FOLFOX arm, Anaemia was more common in FOLFOX arm than in CAPOX arm, and other adverse effects like nausea, vomiting, fatigue, were common in both arms.

Degirmencioglu et al. [5] conducted a study that showed that CAPOX regimen was more commonly used among older patients because of existing comorbidities. In our study, we found no correlation between the treatment regimen and the existing comorbidities.

According to the study done by Degirmencioglu et al. [5] Development of metastasis is significantly higher in FOLFOX arm than in CAPOX arm. Our study found that the Development of metastasis is considerably higher in FOLFOX than in CAPOX.

NUMBER OF CYCLES:

FOLFOX (n=99)	CAPOX (n=31)
MEAN = 9.92	MEAN= 7.19
MEDIAN=10	MEDIAN= 8
% of cycles not completed= 70.7	% of cycles not completed=43.75

The average number of cycles completed in CAPOX arm was 8 (range: 1–10 cycles) the average number of cycles completed for FOLFOX was 10 (range: 1–18 cycle). Among patients that received CAPOX, 43% did not finish the standard eight cycles; of patients receiving FOLFOX, 70.7% did not finish the standard 12 cycles at the time of our study. This result could be inconclusive because of the shorter duration of our study.

In the study performed by Guglielmi A et al. [12] found that Following FOLFOX failure, Irinotecan, and FOLFIRI are at present the most suitable option. In the study by Grothey et al. showed that administration of Irinotecan, along with FU-LV based therapy and oxaliplatin-based therapy, significantly improved the overall survival rate of the patient. In our study, we found that administering Irinotecan after administration of FOLFOX was 20.2%, administering Irinotecan after administration of CAPOX was 29 %, and administering Irinotecan to patients who received both CAPOX and FOLFOX was 64.2%.

The duration of our study is six months; at that time of our study, more than 98% of patients treated with either CAPOX or FOLFOX were still alive.

Limitations of the present study include its prospective nature, short duration, and the low rate of expected events

6. CONCLUSION:

In this study, the main aim is to evaluate the efficacy and safety profile of CAPOX (Capecitabine and Oxaliplatin) and FOLFOX (5-Fluorouracil, Leucovorin and Oxaliplatin) with or without the addition of Irinotecan in the adjuvant settings in patients with colorectal cancer. In this study, patient data, including initial diagnosis, medical history, disease state, tumour pathology, chemotherapeutic regimens, type of surgery, and duration of therapy, was collected.

Both CAPOX and FOLFOX regimens were compared, and it has been identified that FOLFOX regimen was preferred than CAPOX in all the age groups, including geriatric patients older than 60.

When it comes to the safety of these chemotherapeutic agents, both CAPOX and FOLFOX showed several adverse effects, but

the ADR's associated with CAPOX is comparatively higher than with FOLFOX, and also ADR's were much higher when both these regimens were combined.

In most of the cases of high-risk colorectal cancer or stage IV colorectal cancer, this study has identified that a combination of CAPOX and FOLFOX was preferred rather than CAPOX or FOLFOX alone.

Irinotecan is mostly preferred in stage IV of colorectal cancer and administered in most cases in combination with FOLFOX and CAPOX. Combination of Irinotecan with CAPOX or FOLFOX seemed to improve the overall efficacy of the chemotherapeutic agents.

The efficacy of these regimens in this study could not be established due to short study duration, the reason being, efficacy for this study was based on two criteria, i.e. rate of metastasis and death, both of these criteria were inconclusive because the time duration was only six months. During this period, both CAPOX and FOLFOX were equally preferred.

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Leadership Styles and their influence on Church membership growth: A Study of the Pentecostal Assemblies of God Church Kianungu District Nyamira County

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Abstract: Efficient church leadership is core in the numerical growth of church membership. Therefore, the style of leadership adopted by a Church leader will have a bearing in the growth of membership. Poor leadership styles have led to a drop in membership, even for Churches that began with a high membership. A notable example is that of the Pentecostal Assemblies of God Church Kianungu in Nyamira, which over the years has recorded a downward trend in her membership. The purpose of this study was to determine the role of church leaders on Church membership growth. Therefore, one of the specific objectives of the study was to find out the leadership styles applied in Christian churches and its effect on membership growth. The study employed Robert Greenleaf's theory of servant leadership as articulated by Burkus (2010). The study employed a descriptive survey method and data was collected through structured Questionnaires. A stratified random sampling technique was adopted. Primary data was interpreted and synthesized through qualitative methods which employed a quick impressionist summary and thematic analysis. Validity of research instruments was established before data collection. The study findings showed that the growth of church membership is affected by the leadership styles adopted by the members. Despite the fact that there are other factors contributing to Low Church membership growth such leadership conflicts, poor remuneration of pastors, and weak establishment of programs, poor leadership style is a key factor. The ultimate goal of the study was to come up with possible ways on how to adopt the best leadership style that may be used by church leaders in the PAG church to increase the numerical membership growth. This study may also serve a reference material for research in the field of church leadership and membership growth.

Key words: Church leadership, Leadership styles, membership growth, PAG church

1. Introduction

The growth and success of the early church mainly depended on the abilities of the church leaders. This was demonstrated by the powerful preaching of the gospel by Peter which led to the conversion of 3000 people who joined the early church in a single day (Acts 2:41-47). It can be noted in scripture that the increase of church membership is the initiative of the Holy Spirit working through men, the tongues of fire that rested upon the disciples on the day of Pentecost was a theophany that came to impart a missionary purpose upon them. Eims (2008) narrates that it is the responsibility of the church leaders today and their congregants to carry out the mission of God in making him known to the world. Church leaders are responsible for the success or failure of a church. God holds leaders responsible for what takes place in the ranks. It is through responsible and able leaders that God keeps his people in the right direction. Without good leadership the vision and mission of a church cannot be achieved.

It could be noted in scripture that the churches established by Apostle Paul were able to reflect the attributes of God in appropriate ways within different cultural contexts due to good leadership empowered by the Holy-Spirit. This can be traced in the book of 1st Timothy and Titus. But the modern Christian Church seems to be departing from the Pauline principles of church leadership and this has greatly affected the growth and survival of church. The level of understanding anticipated from both church leaders and their followers is missing in most cases and this at times results into conflicts in the church (Jayson, 2016). Church growth has been closely linked with leadership, such that without effective leadership, the ability of a church to achieve sustainable growth is constrained (Muturi, 2009). The church leaders have a responsibility to plan and conduct evangelism, as well as to provide spiritual nourishment to new followers and nurture them to become committed members of their congregations.

The objective guiding this study was to determine the leadership styles adopted by the church and their relationship to church membership growth. The study is significant due to the fact that growth of organizations depends on effective leadership, and the Church is no exception. It relies on its leaders to provide strategy, vision, and guidance in the day-to-day operation of its activities. This assertion is supported by Weems (1993) who posits especially the quality of the pastor's leadership is of great value in the life of the church. Associating success to leadership, Maxwell (2005) argues that "If you want to succeed, you need to learn as much as you can about leadership before you have a leadership position." There is general agreement that there remains a

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research gap between church leadership and church growth, an area to be given much attention (Bae, 2001; Stovall, 2001; King, 2007; Steen, 2008; Burton, 2010; Hagiya, 2011; Stewart, 2012). Therefore, this particular study bridges the gap on the role of leadership on church membership growth.

This study was guided by Robert Greenleaf's servant leadership theory as expressed by Burkus (2010). According to Burkus (2010), the most effective leaders are servants of their people and they get results through whole-hearted attention to their follower's needs. The servant leadership theory emphasizes on collaboration, trust, empathy, and ethics. The assumption of this theory is that if leaders focus on the needs of their followers, the followers will reciprocate through increased team work and be engaged to better performance. The philosophy of servant leadership theory is to meet the needs of the organization and provide a climate for its followers to grow and develop as human beings. This can be realized by valuing people and developing them by providing learning opportunities, modeling appropriate behavior and building others by encouragement.

2. Different types of church leadership styles

The main responsibility of church leaders is to influence others to work together willingly on related tasks to attain that which the organization desires. Before the modern concepts of leadership came into being, the apostle of Jesus Christ had their own styles of leadership to ensure sustainable growth and survival of the church and these has remained the model for the church for ages. The apostle entirely depended on the guidance of the Holy-Spirit from time to time. According to Benincasa (2015) leadership is a process of personal influence by which a leader shapes the attitudes and activities of others towards the attainment of the organizational objectives. Oluwasegun (2005) defines leadership as the ability to gain consensus and commitment to common objectives beyond organizational requirements. Further, James Koroma (2015) defines leadership as process by which a person influences others to accomplish an objective and directs the organization in ways that makes it move in a cohesive and a coherent manner.

According to Dairo (2004) Leadership is the art of getting things done. It can be learnt, improved, developed and perfected. Leadership style is the way a person uses power to lead other people; the most appropriate leadership style depends on the function of the leader, the followers and the situation (Benincasa, 2015).

In essence Christian leadership has unchanging values and principals such as morality, servant hood, and respect for people but the style of leadership varies depending on the individual leader and the situation in which leadership is exercised. A well developed and mature leader has the capacity to exercise different styles of leadership in different situations (Eims, 2008). In times of a crisis a leader may use an authoritarian style, while in a decision making situation the leader may call for consensus-building. Whitney (2016) states that leadership styles are not fixed it is the situation that dictates which style can be used. Specific situations help leaders to determine the most effective style of interactions. Sometimes leaders must handle problems that require immediate solutions without consulting followers while in some occasions consultation is vital.

2.1 Autocratic leadership

In autocratic leadership style leaders make decisions on their own without consulting subordinates or any other dependents. The leader makes decisions, communicate them to subordinates and expect prompt implementation. Robyn Benincasa (2016) urges that autocratic leadership is centered on the boss where by the leader holds all authority and responsibility. Autocratic work environment does normally have little or no flexibility. Autocratic leadership does not give room for guidelines, procedures or policies to be followed; instead this type of leadership dictates situations. Statistically, there are very few situations that can actually support autocratic leadership.

The advantage of this leadership as cited by Gill (2014) is quick in decision making since authority is vested in the leader. There is also complete control of the followers by the leader as compared to other forms of leadership. The disadvantage of this style is that it has open doors to dictatorship. It doesn't give room for consultations with followers. Lutzer (2016) states that autocracy is taught in scripture, elders are to have actual power to lead, control, and make decisions on church matters.

2.2 Democratic Leadership

Democratic leadership involves free participation, freedom in expression of ideas, sharing of responsibilities, justice, competence, courage, and honesty. Olson (2014) states that democratic leadership is one of the most preferred styles of leadership applied in different governments and church organizations. Democratic leadership unlike autocratic is centered on subordinates' contributions in making decisions. The democratic leader holds final responsibility, but he or she is known to delegate authority to other people, who determine work projects. The most unique feature of this leadership is that communication is done in various ranks within the organization.

Democratic leaders have the ability of solving complex issues since they work collaboratively using a consensus of opinions. In democratic leadership power is vested in an elected or chosen leader who influences others to act. Neil (2013) states that the advantage of democratic leadership is that responsibilities are delegated to other team members hence facilitate member participation in decision making. It also empowers group members to accomplish their tasks.

Since democratic leadership applies the principal of equal participation, the members deliberate freely on issues affecting their organization and they arrive on a common decision on a consensus basis. This gives everybody a sense of inclusively which makes the decisions made to be accepted by the majority of the group. In this regard Burkus (2010) observes that delegation of responsibilities and duties among members becomes effective this facilitates participation and results in good production. According to Whitney (2016) democratic leadership has the advantage of empowering group members to accomplish their goals by training them and keeping them informed this fosters good results. Olson (2014) asserts that democratic leadership is suitable in solving complicated issues since it offers the ability to work collaboratively by ensuring team spirit and mutual communication among members. On the other hand that democratic style of leadership has disadvantages also Dairo (2004) observes that

democratic leadership may be affected by indecisiveness during times of crisis. This may lead to prolonged decision making, in matters of urgency democratic leadership may not help. During times of a predicament when directional leadership is needed democratic leadership can be uncertain. Another disadvantage of democratic leadership is time consuming because it gives consultation a priority which may bring about procrastination of urgent issues.

Moses was advised to apply democratic leadership by Jethro in governing the Israelites (Exodus 18:24). He followed the advice and established a hierarchical structure for solving conflicts among the peoples of Israel. This reminds us about the power of delegating authority to others and sharing of tasks which relieves individual leaders from being overburdened.

2.3 Strategic leadership

Whitney (2016) observes that strategic leadership is the ability of influencing others to make voluntarily decisions which can enhance the growth of an organization in a long term period. The strategic leader is engaged to a wider audience at all levels who want to create a high performance in the organization. The strategic leader is not limited to those at the top of the organization. The strategic leader provides a prescriptive set of practice and fills the gap between the need for new options and the need for delivery of services. Burkus (2010) writes, Strategic leadership makes a better future since it focuses on the future to foresee opportunities. This style of leadership clearly defines goals of the company by so doing the company may make better business decisions. The disadvantage of strategic leadership is that it involves a complex process which may not be understood by followers.

2.4 Transformational leadership

Transformational leadership is a style of leadership aimed at initiating change in organizations and groups. In agreement to Dairo (2004) this type of leadership motivates others to work as a team for high achievement. The followers of this style of leadership get more committed and satisfaction as a result of the empowerment from their leaders. Prophet Nehemiah in the Old Testament sets a good example of transformational leadership in his efforts of rebuilding the city of Jerusalem (Nehemiah 2:17-20).

The Advantages of transformational leadership is that the vision of the group is well communicated to followers to get everyone on board. There is also the ability to inspire and motivate followers; passion and enthusiasm are key traits that enable transformational leaders to succeed. The disadvantage of this style of leadership is that leaders may misuse their influence to act unethically (Neil, 2013).

2.5 Charismatic leadership

In describing charismatic leadership Whitney (2016) narrates that Charismatic leadership is based on heroism character of divine origin. This is leadership where by the leader manifests his revolutionary power to transform the follower's values and beliefs by affecting their normative orientation of attitudes. The leader uses his or her personality to gain the admiration of followers, charismatic leaders are effective communicators. Charismatic leaders motivate employees to broaden their abilities and offers growth opportunities for workers. This type of leadership improves working environments thus leads to high production.

Dairo (2004) remarks that while followers may find inspiration through this leadership style, they may also rely too heavily on the leaders in charge. This makes the followers to lack zeal of making valuable contributions to the organization. The leader may fail to bring all the followers into board. This leadership style lacks successful succession. In case the leader dies or quits the group it leaves the followers without knowledgeable successors and this affect the future performance. Olson (2014) observes that charismatic leadership lacks clarity in seeing dangers affecting the organization; this is because the charismatic leader is confidence on his own abilities. Further, this type of leadership style does not give opportunities to mentor others into leadership because the leader enjoys controlling others and therefore denying them opportunity to handle duties.

As noted by Burkus (2010) one of the advantages of charismatic leadership is that it creates emotional appeal by inspiring and motivating followers to action. This creates a strong connection of loyalty between the leaders and his followers. This leadership style also encourages open communication which creates a healthy working atmosphere for workers. One of the greatest charismatic leaders in history is Martin Luther King who brought about great change in the religious society by shaping peoples thoughts and beliefs through his inspiration (Muturi, 2009).

2.6 Laissez- fair leadership

The Laissez-fair leadership gives authority to employees and workers according to departments or zones to work without interference. Benincasa (2015) describes this style of leadership as "delegative" leadership. It allows group members to make their decisions regarding their responsibilities. Team leadership is also identifies as a style of leading by focusing and setting future goals. It brings about inspiration and direction to followers. Team leadership tends to work by putting trust in cooperate relationship. It encourages personal development and values innovation. Olson (2014) argues that this leadership may be failing due to lack of skills. It also requires a lot of supervision and it takes time to adapt to changing circumstances. This style of leadership is the least effective in management and leads to the lowest production. The Laissez-fair style of leadership requires skilled manpower who can work without supervision. Whitney (2016) notes that this leadership style gives a better opportunity to workers to demonstrate their knowledge which makes them grow their skills and expertise.

2.7 Cross-cultural leadership

In discussing cross-cultural leadership, Benincasa (2015) argues that cross-cultural leadership is a style of leadership applicable in different environs which can be applied in the missionary work. In this type of leadership the leaders identifies with different cultures, he/she respects and upholds them. Just as stated earlier there is no leadership style which is perfect at all times.

Those in leadership positions should seek to lead using different styles as situations may dictate one major advantage of cross cultural leadership is that it brings diverse experience and broad thoughts. Its disadvantage is that high performance is rare. In this study the researcher was interested to discover whether cross-cultural leadership style is applied in Kianungu PAG church district.

3. The relationship between church leadership style and membership growth

Church administration is a paramount requirement for doing effective ministry. Indeed churches grow while others decline depending on the type of leadership exercised. A leader is a person with a God given capacity and responsibility to influence a specific group of God's people towards God's purpose (Warren, 1995). Christian leaders should seek to influence God's people towards God's purpose and resist the temptation of influencing people towards self.

The influence of leaders on membership growth is critical. As Brown (2008) concedes all things raise and fall on leadership, church growth depends greatly on its leadership abilities. Jakes, (2016) outlines some strategies applicable for church growth for any church organization; he argues the leaders who intend to grow their church must create a mission statement that gives church planting and evangelism apriority; this gives them the opportunity to gather their resources around a common goal and vision. The church leaders must involve the community by building a good relationship with the people and the local authorities in a given locale and keep on communicating to them that, that church exists to serve them.

Mahoney, (2009) concedes that Christian leadership in the 1st century was purely a responsibility of men who directly received a divine calling from God. The calling of the prophets in the Bible like Elisa, Elijah, Jeremiah, Moses, Samuel, Amos, Isaiah, and others is a clear portrait of how God called leaders to lead his people. The kings that God raised in Israel were both political and religious leaders. They had the responsibility to deliver the people of God from their enemies and influenced the people to the worship God. Brown (2008) asserts that leadership in the Old Testament was established in three main institutions, the Temple, the Sanhedrin, and the Synagogue. The temple was ruled by the priests (Numbers 25:10-13) while the Sanhedrin council was the religious and political institution. The synagogue was a place of prayer and asocial centre controlled by men.

In the New Testament Miller (2011) observes that formal leadership can be categorized into three types; Charismatic, Familial, and Appointive. Charismatic leaders received a direct call of God like Paul and Barnabas, Familial leaders were blood relatives of Jesus like James, and Peter and Appointive leaders were humanly appointed or elected. The idea of appointing church leaders in the early church was as a result of the administrative issues raised from different groups in the church. The choosing of the seven deacons in the book of Acts 6 who were of good reputation, full of the Holy Spirit, and wisdom inaugurated a new dispensation of electing church leaders which the church has followed to date. The teachings of Christ on servant leadership (Mathew 20:26-28) laid the foundation for leadership in the early Christian church. As the early church grew its leadership also grew to meet the needs of the growing numbers.

Njiri (2010), the general superintendent of the KAG church asserts that vision and strategy for KAG church growth is that every local church gives birth to a new church for the period of five years. This is made possible by identifying people with interest and talents in ministry and sponsoring them for basic training, after which they are sponsored to open new churches. The KAG head office buys land/ plots for new churches and supports them with 50% of their sanctuary constructions. This is indeed a great encouragement to pastors and members which needs to be emulated. Such vision can be realized when church leaders are committed to the task of fulfilling the great commission. The church leaders are indebted to provide guidance, inspiration, and guidance to their congregations towards the achievement of the vision of the local church. It is the responsibility of church leaders to demonstrate courage, enthusiasm and commitment in nurturing the talents of their church members towards achieving a common goal.

Eims (2008) argues that the achievement of organizational goals and objectives depends on its leaders. In any institution it is the leaders who set the agenda and influence the personnel in that organization to achieve the best performance. Good leaders motivate the workers by giving encouragements and rewards. The type of leadership that may influence church growth requires justice, fairness, honesty, and integrity. When these traits are practical in leadership the workers get inspired and put all their abilities to better performance. In addition to this a good church leader must have a clear idea of where they want to go, he/she must be able to articulate his /her vision fervently to bring all the participants on board to make them contribute their individual efforts towards the growth of the church.

Listening to criticism is a prerequisite in mature leadership. Warren (1995) states, that a church leader should lead by example and never let pride, envy, guilt, or any other temptation to lure him/her from the bath of service to which God has appointed him /her. Njiri (2010) speaks on church leadership as servant hood to Christ and one another. Whoever wants to be great among you must be your servant (Mathew 20: 26). Glory, power, honor, fame, does not come as a result of position in leadership. The motive for leadership should not be anxiety to exercise authority but to serve. Gathuki (2015) concedes good leaders should demonstrate expertise on the task for which they lead and have skills needed for that leadership. They should have good interpersonal skills, be good communicators and have good personal traits. Good church leaders should demonstrate integrity in their responsibilities; good leaders must work within the context of a prescribed moral ethics in any profession.

Good communication with clarity and conciseness is a prerequisite for successful church leadership Communication in leadership involves listening and responding appropriately. It also involves sharing information and clarifying misunderstandings within the organization (McGauran, 1987). Good communication motivates and energizes others towards a common goal. Good communication skills facilitate decision making which allows the team to capitalize on opportunities.

The respect of authority is fundamental to successful leadership; church leadership is answerable to civil and divine authorities. To go against any governing and ordained authority is unethical and is to go against God's will (Romans 13:1-5, Hebrews 13:17) Church leaders should seek to relate to all people with respect and sensitivity. Without respect of authority it is difficult to accept the recommendation and directives coming from that authority. The Word of God urges us to respect authority

as one of the means of solving our conflicts. (Hebrews 13:17, Romans 13: 1-4) this study sought to establish whether the PAG church leaders respect the ecclesiastical protocols and authority in their governance.

Sunghoon (2014) concedes that Prayer is a vibrant element in the growth and increase of church membership. Church leaders who make impact and cause more people to join their local assembly are those who pray together, methods, goals, programs, and plans without prayer may become dry and short-lived. In Acts 2:1-4 the believers were in one place, praying and waiting for the promise made by the Lord Jesus upon his ascensions. They patiently waited with one accord and the Holy Ghost came upon them; they were filled and were enabled to move far and wide to spread the gospel message. Prayer is like the air we breathe, the food we eat, and the water we drink, it is a necessity for survival in the Christian realm. McGauran (1987), the father of church growth movement argues that prayer is a human partnership with God's divine initiative to revive the Christian church to bring about growth and expansion.

4. RESULTS

The study constituted 99 respondents drawn from 6 pastors, 39 Assembly committee members, and 54 Church members. The questionnaires were structured according to the objectives of the study with the results as follows. The pastors' response on leadership styles adopted by Kianungu PAG Church district, 4 respondents (66.6%) indicated that leaders were democratic, 1 respondent (16.7%) autocratic and 1 respondent (16.7%) charismatic. Therefore, other leadership styles such as strategic leadership style, Laissez-faire leadership style, and Cross-cultural leadership styles have not been adopted by any pastor.

According to the study findings, 13 assembly committee leaders (37.1%) indicates that their pastors have adopted autocratic leadership's style, while 16 assembly committee leaders (45.7%) indicates that their pastors have adopted democratic leadership's style, 4 assembly committees (11.4%) indicates that their pastors have adopted strategic leadership's style, 2 assembly committees (5.1%) indicates that their pastors have adopted charismatic leadership's style, and no pastor has been ascribed to adopt the transformational, laissez-faire and cross-cultural leadership.

On the other hand, 27 church members (50.0%) indicates that their pastors have adopted autocratic leadership's while 18 church members of 33.3% indicates that their pastors have adopted democratic leadership style, 3 church members (5.6%) indicates that their pastors have adopted strategic leadership's style, 2 church members (3.7%) indicates that their pastors have adopted charismatic leadership's style, 3 church members (5.6%) indicates that their pastors have adopted laissez-faire leadership's style, 1 church member (1.9%) indicates that their pastors have adopted cross-cultural leadership's style, and while none in the transformational leadership. This gave contrary views compared to the responses by the pastors and assembly committee members. Therefore, according to majority of members their pastors were autocratic leaders, while the pastors themselves feel they are democratic.

It is evident from the study that democratic leadership is the most preferred style of leadership in Kianungu PAG church district. As cited by Olson (2014), democratic leadership style however, has its own limitations and disadvantages; democratic leadership style is characterized by the philosophy of team work and corporate decision making. The democratic leader relies on opinions and suggestions of the group hence he/she makes no personal decisions. The leader only rubber stamps the decisions the group has made. As a matter of fact, there is no single style of leadership that can be effective at all times and in all situations, certain situations may call for a particular style of leadership to be exercised as discussed in chapter two. This is in accord with the situational theory of leadership as expressed by Benincasa (2015)

5. Conclusions

The study established that although majority of pastors claimed to be practicing democratic type of leadership style, a larger percentage of the congregants at Kianungu Church district perceived their leaders as having adopted an autocratic leadership style. Further this was said to be affecting the numerical church membership growth of the district. The main features of democratic leadership are decentralization of authority and participatory planning through mutual communication, a factor that is likely to positively influence church membership growth. The autocratic leadership style which seemingly is practiced in Kianungu PAG Church district lacks the element of consultation and denies participation of members in key decision making of the church hence affecting numerical growth. The leader is left working alone in an environment that lacks flexibility. In conclusion is need for adopting various leadership styles depending on situation and circumstances because every style of leadership has both advantages and disadvantages. For example, charismatic leadership and servant leadership give direct interpersonal relationships with people through visitation and one on one witnessing, which are essential for numerical church membership growth.

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Almajiri Education and The Mainstream Nigeria Education System in North West Geo-Political Zone: The Journey So Far

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Abstract- Almajiri as a Hausa concept originated from Arabic word MUHAJIRUN, meaning an emigrant. It is widely used to people who migrate from their homes mostly living behind all their luxuries to other places in search for safety, knowledge or religious freedom. The term Almajiri in Nigeria is used to describe those children or youths who left their home towns in search for Islamic education. This system started in the 11th century as a result of the involvement of Borno rulers in Qur'anic literacy. Over seven hundred years later, the Sokoto Caliphate was founded principally through an Islamic revolution based on the teaching of the holy Qur'an. These two empires ran similar Qur'anic learning system which over time came to be known as the Almajiri system. With the arrival of colonialist in Nigeria, Almajiri and the education system lost their prestige and fathers. The education was rendered insignificant by the imperialists government because western education was placed above it and Almajiri and their teachers (Mallams) were left in hunger because their guardians were either dethroned, killed or changed ideology of leadership. This phenomenon compelled the teachers and pupils (Almajiri) to resort to begging (Bara) and Menial jobs in order to survive. The Federal Government of Nigeria is making attempt to integrate western education with Islamic education so as to transform the Almajiris to functional members of society. In order to improve enrolment of Almajiris in schools, the government has built ultramodern schools as well as declared free education across states where Almajiris exist. The present study examined the journey so far in the process of this integration. Five research questions were formulated to guide the study using descriptive survey design. The target population of 240 Almajiris/pupils and 60 mallams/teachers were used to respond to questionnaires of the study, while 33 community leaders and school heads were used for interview. The findings revealed that, there were two types of Almajiri integrated schools. The modern Almajiri integrated schools and locally established ones (adopted ones). And modern ones were further divided into model I, II and III. It further reveals that admission into Almajiri integrated schools can be in a number of ways, thus, through; traditional rulers, through Qur'anic mallam, education secretaries, Islamiyya and Qur'anic schools Management Board and it is sometimes opened to all applicants. The findings further revealed that pupils/students' retention was ensured by the pupils/students' ability to read and write and speak English and Arabic languages. The findings also revealed that good students care like school uniform, feeding, sporting

activities, morality, good security, and control assist students retention and completion in Almajiri integrated schools. The findings revealed that, category one with model I and II has good infrastructure and category two (small centres) suffered dilapidated buildings and acute shortage of school infrastructure without government support. It therefore recommended that, Government should establish an agency for Almajiri education and construct at least two Almajiri integrated schools in each Local Government Area or one in each ward within the area of study. The adopted integrated schools should be supported and fully regulated to take primary and secondary school subjects respectively. The students/pupils basic needs should be taken care of, and ensure quality education, vocational training and morality among the pupils and students. The authorities concern should employ adequate and qualified teachers especially for specialized areas like: Tahfeezul Qur'an, computer studies, English Language, Mathematics, Arabic and Integrated Science. Adequate instructional materials should be supplied to the schools and publish textbook series for primary 4-6.

I. INTRODUCTION

Education is a right to every Nigerian child irrespective of tribe, religion and section or economics background. The Nigeria's policy on education stated that, the philosophy of education is based on the following set of beliefs: education is an instrument for national development and social change; education is vital for the promotion of a progressive and united Nigeria; education maximizes the creative potentials and skills of the individual for self-fulfillment and general development of the society (FGN, 2013). But yet over nine million (9m) school age children were believed to be *Almajiris* who were totally out of school (FGN, 2015). In our contemporary life, education is considered to be the driving force for any development. Nigeria as a nation could not afford to alienate this great number of her population without active contribution to national development.

The Federal Government of Nigeria under President Goodluck Ebele Jonathan led a campaign for the national integration of *Almajiri* Education, which was before then handled by the individual state governments in some Northern states. Basically the aim of the integration by the Federal Government as stated in its policy implementation includes:

- i. provide access and equity to basic education for all *Almajiri* school age;
- ii. Discourage and gradually eliminate itinerancy and begging of *Almajirai* in the country; and
- iii. Support the emergence of an enabling environment that could facilitate the effective integration of Islamic discipline into basic education programme (FGN, 2015).

Despite the laudable objectives much had not been achieved by this integration programme. Even in the areas where a reasonable number of *Almajiris* are found, the ratio of purely western education schools and *Almajiri* Integrated schools is incomparable. For instance, the Federal Government Implementation Committee on *Almajiri* integrated programme reported an allocation of fifty (50) schools in north western Nigeria whereby a significant number of this amount is still on paper. Many parents are still reluctant to send their children, the few that are willing to give their wards could not get the admission. The programme and schools are not heard of until one reach to their destination. Even in state government programme on education is very rear to hear financial allocation or attention paid to this programme.

There must be reasons for this silence and lack of rapid development by the programme. The research work was set to find out the level at which *Almajiri* education was integrated into mainstream Nigeria education.

II. BACKGROUND TO THE STUDY

Different nations of the world introduced various policies approaches towards integrating their minorities into the mainstream national life. For instance, Sibley (1981) explained that in the western industrialized nations, the state is ostensibly concerned with the welfare of minorities. Making provision for housing, medical facilities, special education, market opportunities and employment training programmes to indigenous minorities living in peripheral regions, these were all done with the intention of integrating the peripheral minorities into the mainstream society. Sibley also stated that settlement policies in the old coal mining area of northwestern England, in Durham and Northumberland, for example were for a long period designed to concentrate population in order to provide better access to shopping, education and welfare services. Notwithstanding the preferences of the residents in the mining villages, in general, the benefits of living in large settlements, which oneself- evident to planners, may not be recognized by the client population.

Based on the National policy on Education transformation agenda of Goodluck Jonathan's administration in the country, the Federal Authority took special interest in integrating the *Almajiri* system of education into the mainstream educational system in the country. This was formally signed into law and presented to the National Economic Council in July 2013. On the occasion, the then Minister of State for Education, Nyesom Wike reiterated that the authority had set up the National Committee on implementation of *Almajiri* education programme to ensure that the pupils are provided with opportunities to access Basic Education. The Programme, would also involve acquisition of various skills to enable them participate more positively in the development of their immediate environment and the nation at large. Facilities were also provided to all the 26 *Almajiri* integrated

schools in Nigeria as well as intervention through the Tertiary Education Trust Fund (TETFund) and Universal Basic Education Commission which culminated in the provision of day and boarding facilities for the pupils and their teachers.

Almajiri is a person who is sent out early in life to become a pupil of a Qur'anic school under a teacher known as *mallam*. Okumo (2012) reported that federal government has inaugurated the first *Almajiri* model boarding school in Gagi, Sokoto state. This school which would be replicated across the country is dedicated to the *Almajiri* to ensure education for all Nigerian children to sustain access to quality education. Former president of Nigeria in his inaugural speech stated that "our administration believe that the time has come for the nation to build on the moral foundations of the traditional system by providing the *Almajiri* with conventional knowledge and skills that will enable them to fully realize their creative and productive potentials." An elder statesman Kwande commended the president for the inauguration, he stated that "what the president did was right because if you are a leader, you cannot allow your citizens to be roaming aimlessly on the streets. If they are on the street they are endangered and anything can happen to them. By creating *Almajiri* school their future is now control, in terms of saving their health" (Okumo, 2012).

Almajirishad constituted a segment of Nigerian population poses tremendous challenges to attainment of Education For All (EFA) and millennium Development Goals (MDGs) as well as other notable international conventions and protocols. To neglect this group does not only deny their fundamental human rights but also their innate potentials would remain largely untapped and this may eventually jeopardized the country's pursuit of her home grown technological development and economic transformation. In order to reduce inequality and provide access, the Federal Government set up a committee on implementation of *Almajiri* education programme and charged it with the responsibility of ensuring that this more than nine million (9m) *Almajirai* are integrated into the UBE programme. This is without prejudice to their acquisition of sound Qur'anic knowledge. Obviously, the programme will equip the *Almajiri* pupils with knowledge and vocational skills that will enable them to integrate into the Nigerian society and ensure realization of their potentials.

III. PURPOSE OF THE STUDY

The manner by which *Almajiri* education is pursued in Northern Nigeria raises alarm from different perspectives. The pupils and their teachers (*Mallans*) mostly appeared untidy sending a message of poverty, hardship, child abuse and diseases. In the process of searching for food through begging (*Bara*) or menial jobs, the *Almajiri* endangered both their life and health, mostly through contact with rituals, bad gangs and street violence. Eventually after graduation this group of people is considered unskilled and therefore unemployable. Fafunwa cited by Goodluck & Juliana (2017) described that, apart from Islamic religious teaching the *Almajiri* schools did not provide any form of literacy and training that will make the graduants functional members of civil society. Mostly their lives and families (dependents) continued in misery.

Goodluck and Juliana (2017) described that the Federal Government of Nigeria is making attempt to integrate western education with Islamic education so as to transform the *Almajiris* to functional members of society. In order to improve enrolment of *Almajiris* in schools, the government has built ultramodern schools as well as declared free education across states where *Almajiris* exist. Western education provided a formalized way of learning which make a distinctive difference in the life of its students and teachers and eventually provided skills and employment opportunities for the graduants. For government to cater for the welfare of its citizenry and harness the full potentialities of everyone, government deemed it necessary to integrate the two systems of education without prejudice to anyone. But the main focus is to provide Qur’anic education which the *Almajiri* acquired in their schools (*Tsangaya* or *makarantunAllo*), at the same time acquire western education with employability status. North western Nigeria is a geo-political zone considered to have the highest number of *Almajiris* in Nigeria and one of the two zones where the education started. There are thousands of purely western education schools existing in the zone, but with a very few number of integrated *Almajiri* schools. For instance, the entire Sokoto and Kano states had only 25 formalized *Almajiri* integrated schools many of which had only 100 pupils enrolment, which is having only two sets of classes of 50 pupils each after years of existence. Even the few number that exists, most of the students were not purely street *Almajiri*. What are the issues involved in the process of this integration?

IV. RESEARCH QUESTIONS

The research questions of the study are;

- i. What are the processes involved in admission into *Almajiri* integrated schools in North West geo-political zone, Nigeria?
- ii. In which ways students/pupils were retained in *Almajiri* Integrated Schools in North West geo-political zone, Nigeria?
- iii. What are the government’s commitments towards provision of school buildings and infrastructure in *Almajiri* Integrated Schools in North West geo-political zone, Nigeria?
- iv. What are the government’s commitments towards provision human and material resources in *Almajiri* Integrated Schools in North West geo-political zone, Nigeria?
- v. What are the sources of funding and feeding of students/pupils in *Almajiri* Integrated Schools in North West geo-political zone, Nigeria?

V. METHODOLOGY OF THE STUDY

The study uses descriptive survey design with a target population of all the *Almajirisi*/pupils and their teachers/*Mallams* and community leaders like, village head, district heads, local government chairmen and the school heads of the area under study. The study covers North West geo-political zone of Nigeria which consists of seven states. In selecting the sample number of states, purposive sampling was used to select three mother states

in the zone; these include; Sokoto, Kaduna and Kano states. Similarly to obtain the number of local government areas for the study purposive sampling was used whereby the local government areas in the states where *Almajiri* Model Schools were established were sampled for the study. In this regard, Sokoto state has Sokoto South, Wamakko, Bodinga, Tureta, SabonBirni, and DangeShuni local government areas. Kaduna state comprises of Kaduna North, Igabi, BirninGwari and Zaria local government areas. Kano state consists of Dala, Doguwa, Madobi, DawakinTofa, Nasarawa, Wudil, Warawa, Tsanyawa, Bichi, Gaya, Albasu, Kibiya, Dawakin Kudu and Kobo. This gave a total of twenty five (25) local government areas for the study. Due to the qualitative nature of the study the researchers selected three local government areas from each state and Kaduna state was not visited for security reasons. Therefore a total of six local government areas were selected for the study. A purposive sampling was used to select 40 *Almajiris*/pupils and 10 *mallams*/teachers (except in model I and II who had reasonable number of teachers) that had filled in the study questionnaires in each local government area of the study. Therefore a total of two hundred and forty *Almajiri*/pupils filled the study questionnaires and seventy questionnaires for teachers/*mallams* whereas ten community leaders who comprises one (1) local government chairman, three (3) district heads 5 village heads and one school head making ten (10) respondents for each local government area under study except Kano state where each local government area has only one district head, therefore only two village heads were selected and one coordinator for Qur’anic and Islamiyya School Management of the respective LGEA this gave a total of forty five community leaders and school heads for the interview. As indicated on the table below;

S/N	State	Local Govt Area	<i>Almajiri</i> / Pupils	<i>Mallams</i> / Teachers	Community Leaders/ Sch. Heads	Total
1	Sokoto	Sokoto Sth.	40	10	10	60
2	Sokoto	Dange Shun	40	10	10	60
3	Sokoto	Wamakko	40	10	10	60
4	Kano	Dala	40	10	5	55
5	Kano	Nasarawa	40	10	5	55
6	Kano	Kobo	40	10	5	55
Total	3	6	240	60	45	345

Researchers’ Designed Questionnaires and Interview (structured) were used for data collection. The quantitative data were analyzed using descriptive statistics while qualitative data were analyzed in detail and explained in descriptive form of

analysis after transcription and coding the collected data, all what was recorded were described under the use of themes and sub-themes.

VI. DATA PRESENTATION AND ANALYSIS

This section deals with presentation and interpretation of data results collected through qualitative and quantitative design of the study. The quantitative data were presented and analyzed through the use of frequency table and percentages. Information obtained from qualitative data were analyzed in themes and sub-themes.

VII. PRESENTATION AND ANALYSIS OF QUALITATIVE DATA

The target respondents for the interview were forty five, but due to various reasons ranging from respondents' personal and official commitments only thirty three respondents were captured. Therefore findings from the interview were presented and summarized under the following themes and sub-themes:

1 Admission into Almajiri Integrated Schools

At the beginning of every session the schools admit new students. The schools are of two categories with their mode of admissions and certain considerations before the admission was formalized.

1a Types of Integrated Almajiri Schools

There are two types of Almajiri integrated school

i. Ultra- modern Almajiri schools these consist of ultra-modern Almajiri schools with formalized primary and or secondary school section. This is further divided into model I, II and III

ii. Locally Integrated Almajiri Schools-These are locally established schools that were made to teach Qur'an and aspects of western education. On the other hand some Qur'anic schools were adopted to integrate by having a teacher that teach basic literacy and numeracy to the pupils.

Respondent 1 stated that:

In our area, Almajiri schools are of two categories higher level and lower level. For instance, The Almajiri school in Gagi is not mainly for Gagi community. It is regarded as higher category and their mode of admission is just the same with conventional primary schools. And second category involved those small sized Almajiri schools established locally and sponsored by international communities, but pupils in these schools were Almajiris that were found in the Qur'anic schools but aspects of western education were taught while learning the Qur'an in order to facilitate integration of the two systems. And the secular education teacher was either nominated by the mallam or within the immediate community. There were about ten centers in tudunwada district. And to the best of my knowledge no certificate is issued to such pupils.

This shows that there were two types of integrated Almajiri integrated schools. The modern Almajiri integrated schools and locally established ones. And modern ones were further divided into model I, II and III.

1b Mode of Admission into Integrated Almajiri Schools.

Applicants can be admitted into the schools through a number of ways, these include;

i- Through traditional rulers- there are traditional rulers that actively participate in the affairs of integrated schools in their areas, some parents or guardians can access their children's admission through them. Respondent 33 reported that; from the beginning Baraden Wamakko invited all the village heads (Hakimai) and gave them an allocation of four (4) pupils which we started with and still maintaining the same number. Before formalizing the admission we do interviewed the applicants on Qur'an.

Respondent 17 stated that:

Initially, district heads in Shuni and other districts were asked to bring candidates for the new Almajiri school in Shuni. The entire village heads of Shuni (11) were also asked to give candidates, and we have seen the advantage. What we mostly considered in choosing a child to the school is over-age, those who supposed to be in school already but they were not enrolled. Secondly, we also pick from those in qur'anic schools.

ii. Admission is open to all applicants.

Applicants from within and outside the states were free to apply for admission. It was opened to every applicant without any prejudice and discrimination.

Respondent 1, explained that,

Admission is opened to every interested person without any condition or restriction. I thought after the commission of Almajiri School by president Good Luck Jonathan the school personnel will be going round to get the itinerant Almajiris and admit them into the school. But such has not happened.

iii. Admission through Qur'anic mallams. Sometimes admission into the school can be through Qur'anic teacher {mallam}. Respondent 26 reported that; the admission used to be through Mallam of the Tsangaya schools. Application forms Used to be issued to the applicants. Respondent 6 has this to say,

Admission of new pupils was through their Qur'anic mallams and parents. There was a time we visited one Qur'anic school and requested the mallam to allow Almajiri school to admit his pupils. He lamented that only their parents has that right, so we should allow him to inform them. After which many parents agreed and the children were enrolled.

iv. Admission Through Islamiyya and Qur'anic Education Management Board

kano state government constituted Islamiyya and Qur'anic Education Management Board to oversee the affairs of Islamiyya and Qur'anic schools in the state. The board is therefore responsible for regulating admission of pupils into Tsangaya or Almajiri Integrated Schools in the state.

Respondent 31 added that;

The twelve schools in Kano state were under Kano state Qur'anic and Islamiyya school management board and it is responsible for issuance of guidelines on how admission should be made in the schools. The board examined the number of pupils to

be admitted in each school, after which the number will be distributed to all the forty four LGAs in the state. Stakeholders in the L.G.A like local government chairman, education secretary and district head can further make the distribution within the L.G.A.

v. Children of Traditional Rulers Were Used for First Admission

Village heads were the closest traditional rulers to the masses. Therefore they can be mirror to their masses on what affect their lives. The leaders therefore volunteer and gave their children for first admission in the school for easy acceptability and progress of the school.

Respondent 29 has this to say;

The first year admission was allocated among the entire village heads of Kobo L.G.A and Mallam Ibrahim (mal. Ibrahim was the Qur'anic mallam who gave his Almajiris for admission into the school for pilot alongside with the children of the village heads). In the secondary year, Kano state Qur'anic and Islamiyya schools management Board gave allocation to all the Neighboring L.G.A like RimiGado, Shanono, Gwarzo, BagwaiKaraye and the host kobo L.G.A, presently the admission was controlled by the board.

This shows that leaders can be used to pilot a programme for its success and acceptability

vi. Admission Through Education Secretary

Education secretaries are the executive officers on education in their respective local government areas. They were also involved in the admission process of pupils into the Almajiri schools.

Respondent 32 stated that;

Admission into the school used to be through education secretaries of the twenty three (23) local government areas in Sokoto state under the directive of Universal Basic Education Board. The Education Secretary will liaise with traditional rulers to select children from less privileged families and come to the school for interview which will be used for placement. The successful ones will fill admission form and will be given uniform and other relevant materials for the commencement of learning.

This shows that admission into Almajiri integrated schools can be in a number of ways, thus, through; traditional rulers, through Qur'anic mallam, education secretaries, Islamiyya and Qur'anic schools Management Board, children of traditional rulers were piloted for first admission and it is sometimes opened to all applicants.

1c Areas of Consideration for Admission into Almajiri Integrated Schools.

There are certain considerations before a child is admitted into the school. These include;

i. pupils from Qur'anic schools. Admission into the school used to be from Qur'anic schools.

Respondent 18 explained that,

Admission was opened to all interested applicants even outside the state like Kebbi, Zamfara and Niger states. Initially

only pupils from Qur'anic schools were admitted, but later, even those from other primary schools were transferred to the integrated schools.

ii. Qur'anic Background. Children's Qur'anic background used to be considered for admission into the schools. One of the important thing considered for admission into the school is applicants' Qur'anic education background from home.

Respondent 19 has this to say,

Admission is opened to all applicants, but the most suitable candidates for the school are those with Qur'anic education background, in addition the school admits our children that finished primary school, including those that finish JSS III

iii. Age and interview. The schools differed in age consideration. Some considered lower age of 4-5 years for the beginners while some considered over- age for instance 7-8 for beginners in order to reduce out of school children. Interview also need to be conducted.

Respondent 17 describes that, what we mostly considered in choosing a child to the school is over age, those who supposed to be in school already but they were not enrolled.

Respondent 5 added that,

Children between the ages of four, five and above were admitted into the school with emphasis on developing their morality. The admission was opened to all interested applicants in all the twenty three local govt. areas in the state and other neighboring states, after an interview.

iv. Children from weak families. These children used to be considered for admission in order to relief the parents and save the children from ignorance.

Respondent 16 describes that,

The integration school is important development especially to those in the rural areas and having difficulties in supporting the education of their children. The school is now an opportunity to admit children if the parents are interested.

This shows that before admission into Almajiri integrated schools certain considerations were made these include; pupils from Qur'anic schools, children's Qur'anic background, applicants also attend an interview and age also used to be considered, children from weak families were also considered for admission into the schools.

1d Problems of Students' Admission into Almajiri Integrated Schools.

There are problems surrounding the students' admission into the schools. Some of these problems include;

i. poor communication link between traditional rulers and school authorities. Some traditional rulers were not carried along by the school authorities therefore they were not in the picture of what happens in the schools, so as to encourage parents on that direction.

Respondent 9 revealed that, I have no idea about the school and program, both the district head and school authority

have not contacted me on any issue regarding the Almajiri school. Another respondent added that, “we were not carried along we only knew the school was constructed for the purpose of Almajiri Integration programme.

Respondent 14 explained that,

Parents used to take their wards directly to the school without any contact with village or district heads and we have no idea on the admission process, because we were not included in the process.

ii. Lack of public awareness. People were not much aware about the schools and their programmes,

Respondent 12 stated that,

Parents in my area were not sending their children to these integrated schools for now, because they were short inform about the school and the programme. Mostly people of the immediate communities benefitted much from the schools. Our people need the school but we do not have.

This shows that there were two major problems of pupils' admission into Almajiri integrated schools, these were, lack of public awareness and poor communication link between some traditional rulers and school authorities.

The study reveals that there were two types of Almajiri integrated schools. The modern Almajiri integrated schools and locally established ones. And modern ones were further divided into model I, II and III. It further reveals that admission into Almajiri integrated schools can be in a number of ways, thus, through; traditional rulers, through Qur'anic mallam, education secretaries, through Islamiyya and Qur'anic Education Management Board and it is sometimes opened to all applicants. It was also observed that before admission into Almajiri integrated schools certain considerations were made these include; pupils from Qur'anic schools, children's Qur'anic background, applicants also attend an interview and age used to be considered, children from weak families were also considered for admission into the schools. Children of Traditional Rulers Were Used for First Admission.

2 Students/Pupils Retention in Almajiri Integrated School.

Retention and completion is very important in every project or business embarked upon by any individual. Students and pupils of integrated Almajiri schools are also required to complete their studies after their admission into the schools. The study examined the avenues through which retention and completion were ensured in the schools.

2a Ability to Read and Write

Most of those children admitted into the school cannot read and write in English. But when started their studies in the schools, they can read and write at the same time speak English and Arabic languages. This has so much attracted many students/pupils to stay in the school and continue to benefit in that direction.

Respondent 4 explains that,

One of the important thing that take interest of those pupils to remain in school is the ability to read and write both in Arabic and English languages, they won't allow themselves to

miss this great opportunity. This made the pupils very curious to know more by enrolling themselves into the next level of education which motivate pupils and students towards retention and completion

The findings therefore revealed that students/pupils were impressed by their ability to read and write and speak English and Arabic languages.

2b Students/Pupils' Good Care and Morality

Students/pupils' good care in boarding schools contributes immensely in making them feel at home and comfortable for learning. Morality assists students/pupils to understand what is right and wrong and do the right things for their life and others.

Respondent 18 stated that,

Pupils were retained by taking care of their feeding, engaging them in sporting activities and making them to feel at home. Security of the pupils was also ensured by denying them from illegal exit and blocked any chance of intruding into the school.

This shows that good care and students/pupils' morality can influenced retention in Almajiri integrated schools.

2c Improvement in the Quality of Life

Quality of life involves development of good personality through personal hygiene, responsible life style and good human relation. Students in Almajiri integrated school learn to clean themselves and their clothes regularly and avoid tone clothes. They also learned formally and informally how life is and how things supposed to be done, this usually guide their conducts in their daily affairs.

Respondent 12 added that,

Both parents and children realized the importance of this integration through the improvement in the quality of life of the students. Some of the students were even sponsored to study abroad (Arab countries) after which they can speak three languages Hausa, Arabic and English.

The findings revealed that, the quality of life of the students has significantly improved by absence of begging for food, dirty and toned clothes, hatred on western education and have good accommodation (hostel), water electricity and sponsored abroad for international studies.

2d Provision of Food

Food is one of the basic necessities for life which every individual struggled to get for his survival. Students/pupils in Almajiri School required food for survival as individuals and need it for retention and completion in the school.

Respondent 19 added that,

From what I observed, there was high commitment in the process of teaching and learning, secondly, the student were fed daily with good dormitory for boarding students. All these are quite encouraging that aid retention in the schools.

The findings revealed that food served to students/pupils daily had assisted in retention and completion in Almajiri integrated schools.

2e Vocational Training

Vocational training is extra skills provided to students/pupils to enable them to function on their own, even without opportunities for further education. The training centers (mostly lower category) for Almajiri integration program provided this training. Even some of the upper category has the provision (for eg. Gagi integrated school in Sokoto) but was silent due to some technical reasons.

Respondent 3 stated that;

We Partner with Oando Foundation, our community, UNICEF and NEI+ to promote integration programme in the area. Classroom blocks were constructed, some were rehabilitated and vocational skills were taught to the pupils.

This shows that, the small centres offered various vocational skills that enabled the participant to engage themselves after the training period.

2f Good Advice to Parents by Traditional Rulers

Traditional rulers are the closest community leaders in our society. They enjoyed the honour and respect from their followers, as such they accept any policy or program that traditional leaders actively participated whole heartedly with full confidence that nothing negative would be found in such policy or program. Their advice in this direction has greatly influence students/pupils' retention in the school.

Respondent 8 added that,

After the introduction of the programme, we have a committee that meet with parents monthly to sensitized and enlighten them on the need to allow their wards to complete their education without any interruption up to the university level. And parents had responded positively, because we have no much report on students drop out in the area.

The findings therefore revealed that, traditional rulers' advice to parents/guardian plays a vital role to influence students/pupils' retention in Almajiri integrated schools.

2g Effective Learning and Quality Education

The essence of learning is to be able to have change in behavior which may lead to positive development of the individual and society. This can only be achieved through effective learning and quality education. It was discovered that some Almajiri integrated schools were opportune to enjoy this.

Respondent 30 stated that;

Most of the children admitted into the schools were from needy families who were weak in one aspect or the other while in the school their feeding had been taken care up even this can help them to stay in the school. The way they learn and understand also make them happy and stay for example many people used to compares the level of knowledge of the school children to that of Junior Secondary school, even though they were primary school pupils. This may be connected with the small size of class, staff development through seminar, workshop, as well the textbook series published for the schools.

This shows that effective learning and quality of education can keep pupils busy in the school and attract their interest towards retention and completion.

2h Provision of Basic Needs

In this context the pupils' basic needs were divided into two, thus, basic needs for life and basic needs to live in the school. For any pupil to study successfully the two needs must be met. The pupils must be able to eat food and drink good water, have accommodation and clothing (basic for life). They also need school uniform, reading and writing material, beds and mattresses, house and sport wears (basic needs in school).

Respondent 31 states that;

As you know, the school is for Almajiris, who traditionally beg for food. So the arrangement for good accommodation and three square meals (feeding) is actually attractive that make the pupils to be happy and stay in the school. And there were some specified days that the pupils used to eat chickens or eggs (Fridays). And eat variety of food according to the time table. The school also distributed five set of cloth to the pupils. Uniform two sets, house wear two sets and sport one set and every week each pupil used to receive one tablet of soap for washing. There used to be Qur'anic recitation early morning and evening after the normal lessons, considering the normal lessons all primary school subjects were taught including Tahfizul Qur'an. All these can attract pupils to stay in the school.

This shows that provision of pupils/students' basic needs in the Almajiri Integrated Schools can assist retention and completion.

2i Parents' Visit to Schools

Children in boarding schools sometimes do remember their parents and relatives at home. This at times made the pupils to run away from school or drop out. When parents use to visit them at regular intervals it will relief such children and feel at home so that they stay calm in their schools.

Respondent 32 stated that;

The children's basic necessities were being take care up in the school. Their feeding, accommodation, water, and teaching materials in addition their parent used to visit them mostly after each two weeks and they can bear witness on the condition of their children and there is full security in the school. There was also principal and vice principal quarters in the school. All these had added comfort to the children and promote retention.

This shows that parents' visit to their children in Almajiri Integrated Schools can help in the pupils' retention and completion in the schools.

The findings revealed that pupils/students' retention was ensured by the pupils/students' ability to read and write and speak English and Arabic languages. The findings also revealed that good students care like school uniform, feeding, sporting activities, morality, good security, and control assist students retention and completion in Almajiri integrated schools. It further revealed that, the quality of life of the students has significantly improved by absence of begging for food, dirty, toned clothes, hatred on western education and have good accommodation (hostel), water electricity and sponsored abroad for international studies. It equally reveals that food served to students/pupils daily had assisted in retention and completion in Almajiri integrated

schools. It was quite encouraging that the small centres offered various vocational skills that enabled the participant to engage themselves after the training period. It was also observed that, traditional rulers' advice to parents/guardian plays a vital role to influence students/pupils' retention in Almajiri integrated schools. Effective learning and quality education, provision of basic needs and parents visit to schools can play vital role towards retention and completion in the schools.

3 Infrastructure in Almajiri Integrated Schools

School infrastructures are those facilities in schools that enhance the welfare of students/pupils in schools. These include; the physical building (plant) class rooms and dormitories, electricity supply, water supply, health facilities, furniture, among others. Most Almajiri integrated schools were boarding, which made the infrastructure as basic necessity for the survival of the schools. Availability of good and enough infrastructures assist in arousing the interest of students in schools. They will be happy that they had enough water to use, good toilet facilities among others.

3a Different infrastructure for different schools

The school infrastructure differed based on the type of the school.

Respondent 4 described that,

Infrastructure of school differ, ultra-modern Almajiri integrated school (model I) has wide land and sufficient classes, the school still has empty classes, unlike the small centres which has small area and small classes. In the former, there were cleaners responsible for the school latrines, unlike the latter which is dependent upon the commitment of the teacher. In Gagi district we have about eleven (11) of such centres and one (1) ultra-modern Almajiri integrated school.

The findings reveal that, category one with model I and II has good infrastructure and category two (small centres) suffered dilapidated building and acute shortage of school infrastructure.

3b Health Facilities and Water Supply

Health facilities and water supply are very essential for human life. In Almajiri integrated schools there was provision for a school clinic or school first aid box, depending on the nature of the school. At the same time there was no school established without main source of water, but unfortunately in many schools the source was faulty and repaired, and in others the problem remained unsolved, for instance,

Respondent 5 describes that,

The school infrastructure is good, especially in the health sector there was a nursing staff dedicated to deliver health services to members of the school. The effective water supply was a result of water extension project made by the state government in the school.

This shows that some Almajiri schools had good health care services and effective water supply which was even connected to staff quarters.

3c Shortage of Water

Water is life there will be no rest of mind if there is no water to be use by people. Students in Almajiri schools need water for food, drinking, bath, washing, and religious obligations, among others. If the water is short or inadequately supplied to the schools it means a serious problem to these pupils/students. Unfortunately, some of the students had inadequate water supply. Respondent 18 described that,

Almajiris School has a good infrastructure, I know the school has a bowl hole (drilled) with overhead tank, I don't know what happened to it that I saw a water tanker usually bringing water into school. There was a local well-constructed by one National youth service corps member to complement the water supply in the school. Sometimes the pupils also went to the nearby fadama to fetch water, maybe there was a shortage of water in the school.

This shows that there was shortage of water in some schools. Most of the schools water sources were faulty. There was even a school that used to buy water for school food

3d Poor Condition of the schools

Some Almajiri integrated schools were in poor condition.

Respondent 24 stated that;

The children were in serious problems for instance during the rainy season the pupil used to be sent out of the school because everywhere was filled up with flowing water, there was refuse nearby when mixed the school turned to a different thing and right from the beginning the building was poorly constructed. There was a time when one of the school fence (wall) collapsed, the headmaster lamented to me and led us to see what was happening in the school. The situation compelled me to mobilized people and donated for the reconstruction of the temporary fence.

This shows that some Almajiri Integrated schools were in difficult situations and government could not give a quick response to their demands.

3e Organized Adopted Tsangaya Schools

These are Qur'anic schools solemnly run by their mallams but well organized in terms of classrooms structures, hostels and latrines that can be used for integrated Almajiri education programme. The mallams voluntarily adopted the schools for integration programme.

Respondent 26 explains that;

In Nasarawa L.G.A most of our Tsangaya schools were adopted ones mostly run by their Mallams. Presently within the L.G.A we have four Tsangaya schools that are of high ranking, they have all their structures as found in the conventional school. They have classes, hostels, latrines and water source. And there were primary and secondary schools among them.

This shows that there adopted Tsangayya Integrated Schools that meet standard and taught all primary and secondary schools subjects, that is beyond the teaching of basic literacy and numeracy.

3f Limited Classes and Hostels

Model III schools are small in size and had limited classes and hostels which make it impossible to admit students yearly. The capacity of the school is one hundred pupils only.

Respondent 28 stated that;

So far, the school is still using the existing structure and infrastructure since its inception. But we are still hoping for more infrastructures in order to have increased number of children in the school.

This shows that model III integrated Almajiri schools had limited classes and hostels. They can only accommodate one hundred pupils.

The findings revealed that, category one with model II and III has good infrastructure and category two (small centres) suffered dilapidated buildings and acute shortage of school infrastructure. It also revealed that model I schools had shortage of classrooms and hostels. And there was shortage of water in some schools, there was even a school that used to buy water for school food, though in other schools the situation was good. It further revealed that the schools had good health care services. And some schools were in poor condition and there were adopted Tsangaya Integrated schools that were organized.

4 Instructional Materials and Integrated Almajiri Schools

Instructional materials are those facilities that are used by teachers and students to facilitate effective teaching and learning in a given instruction. These materials include: chalkboard/whiteboard, exercise book, text books, pens/pencils, cardboard papers and other manufactured and improvised materials that can be used in various instructions.

4a Instructional Materials and Computers

Computer plays a vital role in our contemporary world of teaching and learning. Computer assistant instruction eased the task of teachers at the same time helped students to understand instructions easily and make learning more permanent

Respondent 32 described that;

Books were published in series basically for Almajiri schools, both for Qur'an, Arabic and western education. There was also a special curriculum for Almajiri schools and school heads were trained for eight months in Kaduna on the curriculum and its implementation. The school also has a computer lab for computer training.

It shows that some Almajiri schools had adequate instructional materials and computer lab for practical teaching and learning computer studies. It also shows that schools used to give pupils exercise books free and at times parents buy for their children. At the same time text books series were produced purposely for Almajiri schools.

4b International Agencies' Support on Instructional Materials

There are international agencies that take interest on education. Some provide aids or support on capacity training, resource persons, vocational training for self-reliance, text books and instructional materials among others.

Respondent 4 describes that, the centres were better equipped than conventional public schools, because of the support from USAID who designed and produced pupils' books and teachers' guide which teaches reading fluency. This shows that international agencies participate in the provision of instructional materials.

4c Inadequate Instructional Materials

Inadequate instructional materials used to affect the smooth delivery of instructions and its understanding. Some Almajiri integrated schools suffered the inadequacy of those materials and it has negative consequences on the teaching and learning in the schools.

Respondent 15 explains that,

Instructional materials were not always available but when there was shortage and government do not supply, philanthropists and donors in the community usually provided such as; books, biro, uniform etc.

This shows that there are no adequate instructional materials in some Almajiri integrated schools which made some community members to donate in that direction

4d Government Provided Books and Instructional Materials

Instructional materials are essential for the successful delivery of any instruction. In Almajiri integrated schools books and other instructional materials were supplied to the school by government.

Respondent 25 explains that; government used to provide textbooks, exercise books and other instructional materials because is a special programme by the federal government with special considerations. Respondent 30 added that; for the past five years government had provided text book and note books which the school was using. But now that the note books had finished we asked parents to be buying for their children.

This shows that government provides books and instructional materials to Almajiri Integrated Schools. But after sometimes it seizes and parents continue to be buying some for their children

4e There are Textbooks Series

As a new programme, the Federal Government had published textbooks series to be used in all the Almajiri integrated schools in Nigeria. This might guide the smooth and successful implementation of the programme.

Respondent 31 reported that; *the school used to give pupils exercise books whenever they were field up we also have series of text books for all subject from class one to three mainly published for the schools. The only challenged is lack of text books, for senior classes (i.e 4-6).*

This shows that federal government published textbooks series for classes 1-3. But those for classes 4-6 are yet to be published. Teachers were left with the task of researching for the relevant textbooks to use.

4f Local Government Council Provided Instructional Materials

Nasarawa Local Government Education Authority (LGEA) had registered all the Qur'anic schools that volunteer to integrate Qur'anic knowledge with western education. With the registration certain assistance and control used to be rendered.

Respondent 26 reported that about two to three years the Nasarawa L.G.E.A had been distributing instructional materials to twenty two registered Tsangaya schools in the L.G.A.

This shows that with good arrangement, local government education authority can render useful assistance to adopted Tsangaya Integrated Schools.

5 Feeding and Funding of Almajiri Integrated Schools

Food is one of the basic necessities for human life. Students/pupils required food for their survival in Almajiri integrated schools because they were not with their family (parents/guardians). And funding in schools is required for the supply of both human and non-human resources in the schools.

5a The Schools were Completely Funded and Fed by State Government

As mentioned earlier, the schools were of different categories. There are those that were established by the federal government of Nigeria and those established by their respective state governments. But the entire school feeding goes to the respective state government. Respondent 33 reported that; Ministry (i.e Sokoto State Government) is responsible for the funding of the school.

Respondent 1 described that,

The integrated Almajiri school at Gagi was completely founded by Sokoto state government. With good feeding to all students, but for other centers which has itinerant Almajiris has no provision for feeding, the students has to beg for food as usual.

These show that, Model Almajiri integrated schools were completely fed and funded by state governments. Adopted Quranic school centers were not feed and funded by any government. And the boarding model schools were served with three meals and day ones were served with only two meals.

5b Community Leaders do Compliment Government Effort

Government alone cannot cater for all the public demands at a time. As such concerted effort is required for the progress of the society. Community leaders as the closest leaders to people volunteer to compliment government effort for the smooth running of the Almajiri integrated schools.

Respondent 6 explained that;

I know the students were served with three meals daily. And government is trying in providing all the necessary materials like computers for effective teaching and learning. The school has vibrant PTA and SBMC under the chairmanship of District Head Alh. Sani Umar Jabbi. Minor problems and issues were solved and resolved by the district head, those that over powered him, then reported to appropriate authority.

This shows that, the model Almajiri integrated schools were fully funded by government community leaders were only complimenting its effort for the success of the schools.

5c Some Schools were Largely Funded by the Community

Community members having interest on education try their best to assist in one area or the other in the education sector. With their efforts some Qur'anic schools were adopted or converted to be used as Almajiri integrated centres. As such the funding of the schools was largely on the shoulder of that community.

Respondent 3 describes that,

Integration schools in our area were largely funded by the community. We were grateful to sultanate council by complimenting this effort by construction of more classrooms in all the districts in sokoto state.

This shows that community members were participating in Almajiri integration program through the funding of some independent centres. In their communities.

5d No Food Served to some Schools

One major problem in funding education as observed by an interviewee was lack of accountability. "I used to surmise on the huge investment of government on education annually with little impact, but consider the little funding from USAID with significant impact. This might be connected with leadership and accountability. It was concluded that pupils that attended year one to three (1-3) under USAID centre were better in knowledge than those who finished primary six. Because pupils can finish primary six without ability to read and write".

There were some Almajiri integrated schools that were not enjoyed the school pupils feeding. These were mostly adopted Quranic centres that were not directly under the care of government. These pupils have to go out and begged for food (mostly Sokoto state centres) and others were taken care by their Mallams or community (mostly in Kano state centres).

Respondent 16 stated that, 'there was no food provision for the pupils, because the school is not boarding. But if breakfast can be served is a welcomed idea because it will aid learning'.

This shows that the day Almajiri schools in Sokoto state have no provision, while those in Kano enjoyed two meals daily. But the adopted Quranic schools in both states had no official food provision.

5e Some Parents Fed Their Wards

In adopted almajiri integrated schools where government is not fully responsible for funding, the mallams used to make some arrangement with parents on how to feed their children while in the school, because the mallams in such schools do not give chance for begging.

Respondent 26 stated that;

In government constructed Tsangaya schools the pupils fully fed by the state government. In adopted Tsangaya school parent were responsible for the feeding of their words so that they don't go out and beg for food. The Mallams had made an arrangement on how parent will take of the feeding responsibility, and sometimes the Mallams personally do assist in that direction. This shows that some parents were responsible for feeding their children in some adopted Almajiri Integrated schools. Certain arrangements will be made between the mallam and parents on how to provide food for the children.

VIII. PRESENTATION AND ANALYSIS OF QUANTITATIVE DATA

The data collected from Almajiri/pupils and mallam/teachers through questionnaire was presented under the following tables;

Table 1: Distribution of Respondents by Gender

Category	Male F (%)	Female F (%)	Total F (%)
Pupils	240 (100.0)	0 (0.0)	240 (100.0)
Teachers	69 (98.6)	1 (1.4)	70 (100.0)

Source: Questionnaire administered (2019)

Table 1 above presented the age distribution of the respondents. From the result, all the pupils were male, 98.6% of the teachers were male while only 1.4% were female. This suggested that Almajiri schools could be dominated by male children and male teachers.

Table 2: Distribution of Respondents (Teachers) by Educational Qualification

Qualification	Frequency	Percentage
Primary	0	0.0
Secondary	6	8.6
NCE/Diploma	21	30.0
Others	43	61.4
Total	70	100.0

Source: Questionnaire administered (2019)

Result presented in table 2 shows distribution of teachers by educational qualification. From the result, the respondents were made up of 8.6 secondary certificate holders, 30% NCE/Diploma holders and 61.4% with other qualifications. This indicates that data were gathered from respondents that are educated enough to participate in the study.

Table 3: Distribution by Pupils or Almajiri

Qualification	Frequency	Percentage
Almajiri	60	25.0
Pupil	180	75.0
Total	240	100.0

Source: Questionnaire administered (2019)

Table 3 above shows whether children are pupils or Almajiri. From the result, it was gathered that 25% were Almajiris (in Qur'anic schools) while 75% were pupils (from integrated Almajiri schools).

Table 4: Response on pupils' admission into Almajiri integrated model schools

S/N	Items	Agree F (%)	Disagree F (%)	Undecided F (%)
1	Pupils were admitted into the integrated Almajiri model schools because of parental background	220 (71.0)	62 (20.0)	28 (9.0)
2	Pupils were admitted into the integrated Almajiri model schools because the child is street Almajiri	155 (50.0)	134 (43.2)	21 (6.8)
3	Pupils were admitted into integrated Almajiri model schools because of social integration	225 (72.6)	46 (14.8)	39 (12.6)

Source: Questionnaire administered (2019)

Table 4 shows response on pupils' admission into Almajiri integrated model schools. Result presented in the table indicates that 71% of the respondents were of the view that pupils were admitted because of parental background, although 20% objected this response while 9% were not certain. In item two, it can be observed that 50% of the respondents submitted their response upon agreement that pupils were admitted because they were street Almajiri children, however, 43.2% disagreed to this while 6.8% were not sure. In item three, 72.6% of the respondents believed that pupils were admitted due to social integration; however, 14.8% disagreed while 12.6% were not sure. Going by these results, it can be deduced that admission of students into Almajiri integrated model schools in Nigeria was due to parental background, street Almajiri, and social integration.

Table 5: Response on pupil retention in the Almajiri integrated model schools

S/N	Items	Agree F (%)	Disagree F (%)	Undecided F (%)
1	They receive good care	250 (80.6)	28 (9.0)	32 (10.4)
2	They are provided with expected knowledge	256 (82.6)	35 (11.3)	19 (6.1)
3	Their teachers are purely Muslims	257 (82.9)	41 (13.2)	12 (3.9)
4	The schools are closer to their domain	142 (45.8)	125 (40.3)	43 (13.9)

Source: Questionnaire administered (2019)

Table 5 shows response on pupil retention in the Almajiri integrated model schools. The result shows that the pupils received good care (80.6%), are provided with expected knowledge (82.6%), and their teachers are purely Muslims (82.9%). Mixed reaction was found on perceptions of whether schools the Almajiri integrated model schools were closer to students' domain. On this item, 45.8% of the respondents agreed, 40.3% disagreed while 13.9% were not sure. On the basis of the results, it can be deduced that pupils in the Almajiri integrated model Schools receive good care, they are provided with expected knowledge, and above all, their teachers are Muslims who stand a better chance to teach any school subject without deviation from Islamic norms and values of teaching Islamic religious knowledge in the context of modern times than their counterparts who are not Muslims. However, it was very clear that some pupils came from par places while others were still within the immediate environment of the school community.

Table 6: Response on Government commitment in the provision of facilities to Almajiriintegrated model schools

S/N	Items	Agree F (%)	Disagree F (%)	Undecided F (%)
1	Classes	112 (36.1)	185 (59.7)	13 (4.2)
2	Hostels accommodation	152 (49.0)	120 (38.7)	38 (12.3)
3	Furniture	191 (61.6)	105 (33.9)	14 (4.5)
4	Water supply	178 (57.4)	114 (36.8)	18 (5.8)
5	Electricity	222 (71.6)	47 (15.2)	41 (13.2)

Source: Questionnaire administered (2019)

Table 6 shows response on government commitment in the provision of facilities to Almajiri integrated model schools. The respondents submitted their agreement with regards to the following facilities: classes (36.1%), hostel accommodation (49%), furniture (61.6%), water supply (57.4%), and electricity (71.6%). These results indicated that the government is not adequately providing facilities to Almajiri integrated model schools in Nigeria.

Table 7: Response on Government commitment in the provision teaching and learning materials in Almajiri integrated model schools

S/N	Items	Agree F (%)	Disagree F (%)	Undecided F (%)
1	Instructional materials	176 (56.8)	109 (35.2)	25 (8.0)
2	Textbooks/Library	194 (62.6)	93 (30.0)	23 (7.4)
3	Computers	159 (51.3)	67 (21.6)	81 (26.1)
4	Laboratory facilities	89 (28.7)	162 (52.3)	59 (19.0)

Source: Questionnaire administered (2019)

Table 7 shows response on government commitment in the provision of teaching and learning materials in Almajiri integrated model schools. Result indicates respondents' agreement with the provision of the following teaching and learning materials: instructional materials (56.8%), textbooks/library (62.8%), computers (51.3%), and laboratories (28.7%). These results showed that the government has not adequately supply teaching and learning materials to Almajiri integrated models schools in North West geo-polical zone, Nigeria.

Table 8: Response on Comparison between Almajiri school system and western education system

S/N	Items	Agree F (%)	Disagree F (%)	Undecided F (%)
1	Funding	186 (60.0)	102 (32.9)	22 (7.1)
2	Quality of feeding of pupils	204 (65.8)	67 (21.6)	49 (15.8)
3	Quantity of feeding	206 (66.5)	89 (28.7)	15 (4.8)

Source: Questionnaire administered (2019)

Result presented in table 8 shows response on integration of Almajiri education programme into western education system. From the results, 60% of the respondents believe that the system is fully funded compared to western education, although 32.9% disagreed while 7.1% were not certain. Additionally, 65.8% of the respondents were of the view that pupils are fed with quality foods compared to western education system, whereas 66.5% submitted their response upon agreement that pupils are given enough food compared to secular schools. However, the significant percent of those who disagree and those who were not sure indicates this development might not cut across all states where Almajiri integrated schools were established. To this end, the government is not adequately funding the system.

IX. SUMMARY OF THE MAJOR FINDINGS

The major findings of the study are;

- i. The study reveals that there were two types of Almajiri integrated schools. The modern Almajiri integrated schools and locally established ones. And modern ones were further divided into model I, II and III. It further reveals that admission into Almajiri integrated schools can be in a number of ways, thus, through; traditional rulers, through Qur'anic mallam, education secretaries, Islamiyya and Qur'anic schools Management Board and it is sometimes opened to all applicants. The further study reveals that category two of the Almajiri integrated schools outnumbered the category one which was made of up the government controlled Almajiri integrated schools and the whole of the three states under study had a total of twenty five Almajiri integrated schools. All the model III schools has only one hundred (100) students i.e two sets of fifty, since inception. Most of the admitted students were not Almajiris whom the schools were

established for. These had clearly shown that Almajiri education was not well integrated into the main stream Nigeria education in consideration of the number of integrated schools, nature of the students/pupils and the number enrolled into the school yearly.

- ii. Although, the findings further reveals that pupils/students' retention was ensured by the pupils/students' ability to read and write and speak English and Arabic languages. The findings also revealed that good students care like school uniform, feeding, sporting activities, morality, good security, and control assist students retention and completion in Almajiri integrated schools. It further revealed that, the quality of life of the students has significantly improved by absence of begging for food, dirty, toned clothes, hatred on western education and have good accommodation (hostel), water electricity and sponsored abroad for international studies. It equally reveals that food served to students/pupils daily had assisted in retention and completion in Almajiri integrated schools. It was quite encouraging that the small centres offered various vocational skills that enabled the participant to engage themselves after the training period.
- iii. The findings revealed that, category one with model I and II has good infrastructure and category two (small centres) suffered dilapidated buildings and acute shortage of school infrastructure without government support. It also revealed that model III schools had shortage of classrooms and hostels. And there was shortage of water in some schools, there was even a school that used to buy water for school food, though in other schools the situation was good. It further revealed that the schools had good health care services. This shows that government is not doing well in terms of the schools infrastructure because new contracts are not awarded after the initial ones.
- iv. It shows that some Almajiri schools had adequate instructional materials and computer lab for practical teaching and learning computer studies. It also shows that schools used to give pupils exercise books free. At the same time text books series were produced purposely for Almajiri schools. But the publication stopped from series 1-3, 4-6 and that of secondary schools was left to teachers and students to battle with. But the study acknowledges the international agencies participation in the provision of instructional materials. The findings revealed a shortage of instructional materials in some Almajiri integrated schools which made some community members to donate in that direction. This had indicated that instructional materials were also inadequately supplied.
- v. The study also reveals that, Model Almajiri integrated schools were completely fed and funded by state governments. Adopted Quranic school centers were not fed and funded by any government. And the boarding model schools were served with three meals and day ones were served with only two meals. This shows that, some Almajiri integrated schools students were opportune to received enough food. It therefore reveals that, the model

Almajiri integrated schools were fully funded by government, community leaders only complimenting its effort for the success of the schools. It further reveals that community members were participating in Almajiri integration program through the funding of some independent centres in their communities. The study therefore discovered that the day Almajiri schools in Sokoto state have no provision for food, while those in Kano enjoyed two meals daily. But the adopted Quranic schools in both states had no official food provision. This shows that government is making effort in maintaining the pupils' feeding.

X. DISCUSSION OF FINDINGS

The discussion of the findings was done based on the order of the stated research questions of the study. Thus;

i. **What are the processes involved in admission into Almajiri integrated schools in Worth West geo-political zone, Nigeria?**

The study was set to assess the integration of *Almajiri* education into the mainstream Nigeria education system in North West geo-political zone, Nigeria. It reveals that there were two types of *Almajiri* integrated schools that is the modern *Almajiri* Integrated Schools and the Adopted *Almajiri* integrated schools. The total number of the modern integrated schools in Kano and Sokoto was twenty five (25) which is incomparable to the number of primary and secondary schools in the states. FGN (2015) describes that over nine million (9m) school age children were believed to be *Almajiris* who were totally out of school. With this number of schools how can twenty five (25) schools in the two giant states of Kano and Sokoto make a significant absorption of this numbered with model III admitting only one hundred students. The adopted *Tsangaya* Integrated schools that were made to support the programme were ill-equipped and not supported by government and most of them ended their programme on basic literacy and numeracy which has shallow provision for further education.

The mode of admission into the *Almajiri* integrated schools use to be in a number of ways. Through traditional rulers, through Quranic *Mallams* education secretaries, Islamiyya and Quranic school management Board and it is sometimes opened to all applicants. These multiple ways for admission indicated a sign of improper organization in the programme. A common way for admission supposed to be device. For instance, the three levels of education in Nigeria had common means for admission, primary school through headmaster/sells of forms, secondary schools through common entrance. Tertiary institutions, through Joint Admission and Matriculation Board (JAMB). The study further reveals that certain considerations used to be made before admission. These include; pupils from Qur'anic schools, Qur'anic background; age and interview and children from weak family. These considerations are just like guidelines or requirements for admission into any formal school system. For instance, before admission into primary and secondary schools certain things need to be considered like; Age, interview and qualification. Therefore the considerations for admission into integrated *Almajiri* schools only need to be organized and standardized to become guidelines for admission into *Almajiri* Integrated School.

ii. In which ways students/pupils were retained in Almajiri Integrated Schools in North West geo-political zone, Nigeria?

After admission of pupils/students into *Almajiri* integrated schools measurers used to be put forward to ensure retention and completion of learners in the schools. The quantitative data revealed all *Almajiris* and pupils were male. This shows the fact that popular *Almajirci* used to be carried out by male child. The study reveals that certain things used to assist pupils/students retention in the schools, they include; ability to read and write: pupils /students good care and morality; improvement in the quality of life; provision of food; vocational training: good advice to parents by traditional rulers: effective learning and quality education provision of basic needs and parents visit. One of the basic function of formal school is to provides basic intellectual skills - reading, writing and simple Arithmetic calculation (Mahuta, 2007). Pupils of *Almajiri* integrated schools were lacking these skills before joining the schools, as they now enjoy the skills, they still wish to continue in the schools. The school also teaches character and morality. That is why the personality and morality of the pupils improve significantly and clear difference appeared between the students/pupils and the itinerant children. *Almajiri* integrated schools used to provide food to students/pupils just as supplied to conventional boarding schools and this plays a vital role in retention and completion in the schools. The schools also provided vocational skills that prepared learners to become self-reliant. Vocational education (skills) prepares people for specific trades, crafts, and career at various levels (en.m.wikipedia.org/wiki/vocational-education). Effective learning and quality education also assisted retention in the schools. This provides meaningful learning and progressive education which will, make the children to feel the impact. This implies the John Locke's concept of education which he terms as "progressivism". For every life to survive it must be able to meet the basic needs of life. Most of those basic needs were supplied to the students/pupils in order to live as individuals and also live in the school successfully. These might be connected with the little number of pupils and limited number of schools. Because most of the things supplied to schools was done only once (First issue) which indicated government negligence on education and *Almajiri* Education Programme in particular.

iii. What are the government's commitments towards provision of school buildings and infrastructure in Almajiri Integrated Schools in North West geo-political zone, Nigeria?

The school infrastructure is still good in some schools like model I and II, but model III has limited classes and hostels and even occupied small area of land accommodating only one hundred pupils at a time. This is very meager compare to what is operating in conventional primary schools. Some schools had good water supply while in some schools it was inadequately supplied, electricity and furniture were mostly in good condition.

iv. What are the government's commitments towards provision human and material resources in Almajiri Integrated Schools in North West geo- political zone, Nigeria?

Government commitments towards the integration of *Almajiri* education in the mainstream Nigeria education system can be manifested in a number of ways thus: establishment of adequate *Almajiri* integrated schools: employment of adequate and qualified teachers; provision of instructional materials; school infrastructure; basic needs of students/pupils in the schools as well as training and retraining of staff. To what extent government was able to realize the above mentioned so that it can be found committed on the integration? For instance, qualified and enough teachers were not employed for the programme. A non-governmental organization has to employ the services of qualified *Alarammas* to taught *Tahfeezul Qur'an* in some schools. Secondly, some schools paid their *Alarammmes* through the efforts of Parents Teachers Association (PTA). Thirdly some schools were not properly teaching *Tahfeez* which is one of the important subjects in the schools. And lastly some schools had computers in store but had no qualified teachers to teach the subject the same thing applied to vocational training machines. This clearly shows that enough and qualified teachers were not employed for the programmed. Before, there used to be enough instructional materials. This happened when the programme was new and the necessary materials were issued to schools. Few years later the materials were used up where parents had to continue buying exercise books, pens, and uniform for their children. Teachers have to look for primary 4-6 and secondary school text books for teaching their relevant subject areas, because the text book series stopped at primary 1-3 even the computer systems can only be found in well managed schools, because all the materials were issued once.

v. What are the sources of funding and feeding of students/pupils in Almajiri Integrated Schools in North West geo-political zone, Nigeria?

The findings reveled that state government is completely responsible for funding the recurrent expenditure of the schools. Therefore the students/pupils received their normal square meal daily. Mattresses, beds and text books were first issued by the federal government since the inception of the schools and no more. On training and retraining of teachers, head teachers were trained on *Almajiri* Education curriculum and implementation, though such need to be extended to teachers and other areas of the integration program. These had clearly shown how government is less committed in maintaining and expanding the programme. Things are at stand still in almost all the *Almajiri* integrated schools and the adopted centres were not supported by government.

XI. RECOMMENDATIONS

The study recommends the following;

1. Government should establish an agency for *Almajiri* education and construct at least two *Almajiri* integrated schools in each Local Government Area or one in each ward within the area of study. The adopted integrated schools should be supported and fully regulated to take primary and secondary school subjects respectively. The constituted agency should be mandated to carry out all the admission exercise through liaison with tradition rulers in the areas.

Therefore traditional rulers should be fully engaged in the programme.

2. The students/pupils basic needs should be taken care of, and ensure quality education, vocational training and morality among the pupils and students.
3. The authorities concern should employ adequate and qualified teachers especially for specialized areas like: Tahfeezul Qur'an, computer studies, English Language, Mathematics, Arabic and Integrated Science. Adequate instructional materials should be supplied to the schools and publish textbook series for primary 4-6.
4. Re-visit the schools infrastructure in Almajiri Integrated Schools within the study area so that the needful can be down in terms of water supply, electricity and health facilities.
5. There should be cash allocation to *Almajiri* integrated schools. This will assist the school management to cater for any emerging problem within their capability. Seminars and workshops should be organized for teachers and heads teachers for advance knowledge. Special allowance should be paid to school heads and teachers as incentives to burst their morals.

XII. CONCLUSION

Almajiri education is not well integrated into the mainstream Nigerian education. Government is required to do the right things for the smooth integration. Traditional rulers can also play a vital role in admission process and supervision of school

activities. Government commitment was found to be very low which also affect the successful achievement for the set objectives of the programme.

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Accounting Accountability of Islamic Culture

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Abstract: The influence of religion in accounting practice is not a problem that has been explored for most studies in conventional literature although this can easily be seen how the two are interrelated. Religion has a role in shaping and enforcing ethical behavior such as honesty, and justice which in a community these values can be characterized by a high level of trust in business affairs and financial management. This article is intended to produce an understanding of the contribution of Islamic culture in accountability by using a qualitative approach based on literature study to obtain a broad overview of accountability in Islamic culture. The main task of a Muslim is to serve God (Allah) in all aspects of life because Islam does not recognize divisions between secular and sacred activities. The Islamic framework guides people through divine revelation which governs all social, economic and political activities, and does not accept secularism as something different from religion. Islam has its own cohesive rules that dictate how business should be run and these rules can be applied at any time and in any culture. Therefore, accountability in Islam is an obligation that must be carried out as a form of accountability to stakeholders or the wider community.

PRELIMINARY

The influence of religion on accounting is not a problem that has been explored for most studies in conventional literature although this can easily be seen how the two are interrelated. Traditionally, religion has a role in shaping and enforcing ethical behavior such as honesty, and justice. Where in a community these values can be characterized by a high level of trust in business and financial affairs. In general, culture is known as the determining factor of accounting. Where culture is a factor that distinguishes members of one group from another group regulates how individuals view their responsibilities in carrying out the task. If culture is considered to influence the application of accounting, so does religion. (Hamid, Craig and Clarke, 1993; Lewis, 2001). For example, in the biblical command to give Caesar the things that belong to Caesar and to God the things that belong to God, where this causes a difference between the sacred and the secular. Whereas in Islam, the realms of God and Caesar are one, not separate jurisdictions, as permitted by Christianity (Lewis, 2001).

Two specific aspects that shape the relationship between Islam and accounting one of which is that Islamic law, sharia, claims to regulate all aspects of life, ethics and social, and includes criminal jurisdiction and also civil jurisdiction. Every action taken must be in accordance with Islamic law and comply with ethical standards derived from Islamic principles. Accountants, like other adherents, must carry out their duties in accordance with Islamic regulations and base their actions on Islamic ethical norms. This ethical principle defines what is true, fair, the nature of corporate responsibility, community priorities, along with some specific accounting standards. Second, besides providing a set of business ethics, certain Islamic economic and financial principles have a direct impact on accounting practices and policies.

Based on ethical principles in Islam, accounting requires fairness and honesty in corporate responsibility called accountability. This accountability is a form of corporate or organizational responsibility especially for organizations engaged in the non-profit field.

In this article, I will review the nature and nature of Islamic business law. Then review accountability in the perspective of Islamic law. The final section will discuss accountability in terms of religion, especially in non-profit Islamic religious organizations.

METHOD

This article is intended to produce an understanding of the contribution of Islamic culture in accountability. In the process, this article uses a qualitative approach based on library studies to obtain a broad overview of accountability in Islamic culture. Literature study is a written summary of articles from journals, books and other documents that describe both past and present theories and information. According to Sugiyono (2012), library studies are related to theoretical studies and other references relating to values, culture and norms that develop in the social situation under study, besides library research is very important in conducting research, this is because research will not be separated from literature -Scientific literature. Based on this understanding, then the article on the contribution of Islamic culture in accountability uses a variety of materials contained in the library space, such as journals, books, and other literature relevant to the topic of discussion. Thus this article aims to explore the idea of an Islamic cultural approach as a basis for increasing accountability, especially in non-profit Islamic religious organizations.

RESULTS AND DISCUSSION

Nature and Islamic Business Law

Those who spearheaded Islamic economic thought developed regulations to carry out trade, banking and finance from Islamic or sharia law. The literal meaning of the Arabic word sharia is "the way to the source of life" and, in a technical sense, it is now used to refer to the legal system in accordance with the code of conduct based on the Qur'an and hadith. Muslims cannot combine their behavior into religious and secular dimensions (Simanjuntak & Januarsi, 2011), and their actions are always bound by sharia. Thus, Islamic law embodies a set of duties and practices that include worship, prayer, etiquette, morals, marriage, inheritance, crime, and commercial transactions which cover many aspects which do not have to be considered as laws elsewhere (Lewis, 2001). As such, Islamic law is entirely religious, and because holy law contains the core of the Islamic faith itself.

Just as Islam regulates and influences all other areas of life, it also regulates business and trade behavior. Muslims must carry out their business activities according to their religious requirements in order to be fair, honest and fair to others. Rahman in Lewis (2001) notes that there are a large number of Islamic concepts and values that determine the level and nature of business activities. There are many positive values such as iqtisad (moderation), adl (justice), ihsan (goodness), amanah (honesty), infaq (expenditure to fulfill social obligations), sabr (patience) and istislah (public interest). Likewise, there are a number of negative values, and therefore must be avoided, namely zulm (tyranny), bukhil (miserliness), hirs (greedy), iktinaz (accumulation of wealth) and israf (waste). Economic activity in positive parameters is halal (permissible and praiseworthy) and in negative parameters is haram (prohibited and despicable) which must be moderated. Production and distribution regulated by halal code must be in accordance with the definition of adl (justice). Collectively, these values and concepts, together with the main commands of the Qur'an, provide a framework for fair business and commercial systems.

Islamic Accounting - Social Accountability

In the Qur'an, the word Hisab is repeated more than eight times in different verses (Askary and Clarke, 1997). Reckoning or "account" is the root of accounting, and references in the Qur'an, reckoning relating to one's obligation to take into account all matters relating to human endeavors for which every Muslim is accountable (Lewis, 2010). All resources available to individuals are made in the form of trust. Individuals are trustees of what they have given by God in the form of tangible goods, property and assets. The extent to which individuals must use what is entrusted to them is determined in sharia, and the success of individuals in the afterlife depends on their performance in this world. In this case, every Muslim has an "account" with Allah, which records all good deeds and all bad actions, an account will continue until death, because God shows everyone about their judgment on the

day of their judgment (SA: 62). This adds an extra dimension to evaluating things and actions compared to what is included in conventional financial statements.

The basic similarity between reckoning in Islam and accounting lies in the responsibility of every Muslim to carry out the tasks described in the Qur'an. Likewise, in business enterprises, management and capital providers are responsible for their actions both inside and outside their companies. Accountability in this context means accountability to stakeholders or the wider community. Many conventional accounting practices that best fit the concept of personal liability do not seem to fit the type of liability required under sharia. Thus, one of the main objectives of Islamic accounting is to provide information that frees those involved in the company from their responsibilities to the public.

Accountability of Religious Nonprofits

A religious organization is an organization whose activities are related to a particular religion, both concerning matters of worship and all activities in carrying out its obligations towards God related to certain religions and beliefs. This religious organization can refer to organizations within a mosque, mosque, church, temple, temple, temple, temple, and other organizations outside of religious organizations engaged in the religious field. So that in the process of implementation, this religious organization is managed by an institution or organization that arises from the awareness to carry out the vision and mission in accordance with the teachings of each religion (Bastian, 2007).

Basically religion is more focused on the problem of moral values that must be applied in life. Therefore, religion which is a teaching that carries the message of God must be translated and interpreted as relevant to human life in the economic, political and cultural aspects of humanity. So in this case, religion cannot be separated from science, one of them is accounting.

Accounting is seen as a field of science that is more on worldly practices that are separate from religious or spiritual values (Simanjuntak & Januarsi, 2011). So the perception of religious institutions is dominated by the understanding that accounting is a practice that only focuses on financial practices that are more worldly in character. This results in religious institutions becoming more apathetic towards the role of accounting and considers that accounting is not much needed in the performance of services in religious institutions (Simanjuntak & Januarsi, 2011). This opinion is not entirely wrong or right, because basically accounting can be interpreted more broadly, not only focused on conventional financial reporting practices.

Accounting practices cannot be separated from the values, conditions, and influences of the surrounding circumstances, including the influence of religion in the field of accounting. Although discussions between accounting and religion are still rarely discussed, the link between the two can be easily seen (Lewis, 2001). Traditionally, religion has a role in shaping and applying ethical behavior such as truth, honesty and justice. Whereas in accounting, ethical behavior also becomes very important in accounting practices.

In the process of its implementation, religious organizations cannot rule out accounting. The existence of accounting in religion or religious organizations in it can be seen both from historical evidence and the contents of the scriptures that guide each religion (Bastian, 2007). The matters regulated in the holy book include, among others, the activities of buying and selling, debts and leases based on truth, certainty, openness and fairness between the two parties that have a relationship. So it can be concluded that religion and accounting science have a relationship as a form of accountability of the management of the organization to the owner and third parties, both donors, lenders and banks.

Religious organizations can be classified characteristically into non-profit organizations. This is because religious organizations are more focused on providing services and are not oriented to make a profit with funding sources that come from donations, investments, charging fees for services provided and providing assistance from the government. So, in the implementation of financial management, non-profit organizations do not make a profit but can get a profit or a surplus which is the difference between cash inflows and cash outflows (IAI, 2010).

As a non-profit-oriented organization, a non-profit organization has a primary business goal to provide services to the community and not to maximize the prosperity of the shareholders. Therefore, the management system in a non-profit organization is generally chosen by the board of management, both leaders, management or the person in charge who will give accountability to the owner and the funder. The accountability of the board must be transparent and accountable so that the information provided is reliable and trustworthy (Mohamed et al., 2014; Randa, 2011; Said et al., 2013; Simanjuntak & Januarsi, 2011). Related to the concept of accountability in relation to accounting as a means of accountability, accountability is an inseparable part of a non-profit organization. So the nonprofit organization needs to present financial reports that can not only be used to assess the entity's nonprofit organization in providing its services and the sustainability of service delivery but also assess the accountability of the board of management for the duties, obligations and performance mandated (IAI, 2010).

Religious organizations as part of non-profit organizations have an obligation to compile financial reports as a means of accountability for the management of donors in managing the funds that have been given. In general, the Indonesian Institute of Accountants regulates the mechanism for preparing financial statements of nonprofit organizations in Statement of Financial Accounting Standards Number 45 concerning Financial Reporting of Nonprofit Organizations, which outlines the purpose of preparing financial statements, the nature of fund restrictions, and the components of financial statements in nonprofit organizations (IAI, 2010).

But unfortunately, accounting practices in religious institutions or organizations are still considered to be less common. In general, the board of directors of religious institutions is more likely to manage resources and to report in a reasonable manner without seeing the rules or standards that apply. So in this case some researchers are interested in examining accounting practices in religious institutions, especially highlighting the accountability of the financial statements prepared. In a study that examined the management of church funds, it was revealed that there were two fund management, namely stationary funds and development funds that had been prepared in a report of accountability to all church congregations in a transparent manner by announcing the receipt and expenditure of sources of funds obtained each week at the convention. (Randa, 2011). This shows the existence of accountability practices in the management of church resources in which the meaning of Christianity, spiritual, obedience, love, and example becomes a reference to animate the value of accounting and accountability of church duties (Tumiwa et al., 2015).

On the other hand, although a study of financial statements in a mosque in Tangerang district shows that financial reports have a role as an important instrument for mosque management as a manifestation of honesty and accountability of the management (Simanjuntak & Januarsi, 2011). However, this raises a new dilemma, which encourages "happy" behavior. So in this case, transparency and accountability are not yet fully implemented.

In addition to several research studies on the role of financial statements in the accountability of religious institutions in both churches and mosques that were previously revealed, several other researchers also suggested that in non-profit religious institutions, good internal control and active involvement of mosque committees in funding activities could improve mosque financial performance. (Mohamed et al., 2014; Said et al., 2013). A good and strong financial performance of the mosque will help facilitate the mosque to conduct quality programs. So in this case the mosque fund management system, especially on internal accountability and control practices is needed. The mosque is classified as a non-profit organization that handles public funds received from the government, corporate and community donations, thus requiring control over financial activities in handling funds received and disbursed by the organization.

CONCLUSION

The main task of a Muslim is to serve God (Allah) in all aspects of life because Islam does not recognize divisions between secular and sacred activities. Accounting, if done in accordance with Islamic law (shari'a), must be the same as the act of worship as worship. Where this differs from the conceptual framework of accounting that is currently applied in the West, which finds

justification in the dichotomy between business morality and personal morality (Lewis, 2010). That kind of thing is not accepted by Islam. The Islamic framework guides people through Divine revelation which governs all social, economic and political activities, and does not accept secularism as something different from religion. Islam has its own cohesive rules that dictate how business should be run and these rules can be applied at any time and in any culture. Therefore, accountability in Islam is an obligation that must be carried out as a form of accountability to stakeholders or the wider community. This is in accordance with one of the main objectives of Islamic accounting, namely to provide information that frees those involved in the company from their responsibilities to the public.

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Determinant Factors Influence Child Marriage in Cugenang Sub-District, Cianjur District

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Abstract- Background

Child marriage is a marriage of one or both partners under the age of 18 according to the 2002 Revised Child Protection Act 2014. Indonesian child marriage is ranked seventh in the world and second in Southeast Asia. This happens because Indonesia is contributed by child marriage rates from various provinces, one of which is West Java, which is the absolute highest child marriage in Indonesia with 273,300 child marriages and ranks 14th with 13.36. Cianjur Regency is one of the highest child marriage contributors in West Java at 22%. Factors contributing to child marriages are poverty, geography, lack of access to education, lack of access to comprehensive reproductive health services and information, social and cultural norms including religious interpretations. This study is still needed and is very positive in Indonesia in connection with efforts to prevent child marriage in areas that have different factors.

Method

A cross-sectional study design of the primary conducted by researchers in Cugenang Subdistrict, 11 Villages in 2020. Data collection was conducted over two weeks with 245 respondents, using survey sheets adapted from the International Plan: Asia Child Marriage Initiative — Index of Acceptability Analysis of these factors will produce a dominant factor that drives child marriages in Cugenang District, Cianjur Regency. In this study analyzed by doing a chi square test with 95% confidence interval (CI) and logistic regression analysis.

Result

Based on the results of this study the proportion of child marriages in Cugeanang District Cianjur Regency is 29.39%. Multivariate logistic regression test shows that education is a dominant factor driving child marriages 3,127 times (95% CI: 1,482-6,986) more at risk of child marriages than access to reproductive health information, traditions / culture, religious views.

Conclusion

Education is one of the dominant factors driving child marriages, this can also be a major factor in preventing child marriages. Therefore, the effort to keep children in school is one of the important aspects in preventing child marriages. This not only has implications for preventing child marriage, but by going to school and not marrying children will contribute to increasing the country's HDI. This is certainly not necessarily linear, it needs work with multistakeholders as we know that the problem of child marriage is a complex problem that must involve all sectors in the prevention of child marriage programs in Cugenang District, Cianjur Regency, West Java.

Index Terms- child marriage, determinant factors, education, sexual reproductive health and rights

I. INTRODUCTION

Marriage is an inner bond between a man and a woman as husband and wife with the aim of forming a happy and eternal family (household) based on the Godhead (Marriage Law 1/1974). Child is someone who is not yet 18 (eighteen) years old, including children who are still in the womb (Child Protection Act 2002 Revised 2014). Child marriages are marriages, both formal and informal, that are conducted by men and women, one or both of whom are under 18 years of age (UNICEF, 2014). Indonesian Marriage Law No. 1/1974 article 7 states that the minimum age for marriage is 16 years old for women and 19 years for men. The law was successfully revised by law Number 16 of 2019, amendment to Article 7, namely the minimum age of marriage for women and men is over 19 years.

The 2013 Basic Health Research (Riskesdas) conducted by the Indonesian Ministry of Health revealed that among women 10-14 years old, 2.6% married for the first time at the age of less than 15 years, and 23.9% were married at the age of 15-19 years. Data on the National Socio-economic Survey (Susenas) 2018 shows that 1 in 9 girls in Indonesia aged 20-24 years are married under the age of 18 or the prevalence is equal to 11%. Whereas for boys there is 1 out of 100 boys aged 20-24 years married under the age of 18 years or equal to the prevalence of 1%. Meanwhile, the prevalence of women aged 20-24 years who married before the age of 15 years was 0.56%. Child marriage is not specifically a problem of Indonesia, but a global problem. There are 117 of 198 countries in the world including the United States of America permitting child marriages as seen from the Marriage Law which is owned by countries in the World (Alexandra et al, 2016). The prevalence of child marriage in Indonesia is 11.2% (BPS, 2020). This has pushed Indonesia to become the 2nd highest country in ASEAN for child marriage rates (BKKBN, 2012). Whereas in the World, Indonesia ranks 7th highest absolute number of child brides (girls not brides, 2016).

In Indonesia, the highest prevalence of child marriage occurs in the province of West Sulawesi, 19.43%. However, West Java is the province with the highest absolute number which is estimated to reach 273,300 child marriages. West Java is among the 20 provinces with the highest prevalence of child marriage of 13.26% and is the highest prevalence in Java (BPS and UNICEF, 2020). Cianjur District is the first regency in contributing child marriages in West Java with data on 22 percent of female adolescents who have already married children (BPS and UNICEF, 2016).

Based on DPPKBP3A data Kab. Cianjur in 2015 mentioned child marriage in Cianjur 80.71% of women married at the age of less than 21 years. Cugenang sub-district is the top 10 sub-districts contributing marriages of children under the age of 20 from 32 subdistricts in Cianjur Regency (DPPKBP3A Cianjur Regency, 2015). The data was corroborated with data reported from KUA of Cugenang Subdistrict during 2018 child marriages which recorded 66 cases, 2019 recorded as many as 58 cases, and January 2020 recorded 12 cases (KUA of Cugenang District). District Court of Religion. Cianjur stated that 60% of requests for dispensation were due to reasons for the age of women under the age of the Marriage Law (Nursalikah, 2019).

Based on KPPPA and UNFPA research results in 5 districts the cause of child marriage consists of 4 sides: the child side includes low education, dropping out of school, expensive tuition fees, distance and safety, teaching patterns at school, child age pregnancy, lack of availability of children's creative space, children as economic assets and family and environmental stresses; the family side includes poverty, pressure, trafficking, wrong parenting, shame because a child is pregnant; the cultural and religious side includes the culture of young marriage, matchmaking of children, puberty being a reference for marriage, no sanctions; the State side includes enforcement of marriage law, enforcement of child protection law, and no child marriage sanctions and the unavailability of national and regional action plans (KPPPA and UNFPA, 2018).

Low level of education and knowledge of children can cause a tendency to get married at an early age (Alfiyah, 2010)). This is in line with research conducted by Ma'mun, (2015) which shows that young adolescents with low education have a risk (ods ratio) 2,846 times to get married early than young adolescents with high education. The family economy is thought to be one of the factors that trigger child marriages. The 2016 Susenas data states that girls from low-spending families have five times the chance to experience child marriages compared to those from families with high expenditure levels. However, this factor is not absolute because in reality child marriage takes place at all levels of the Indonesian economy.

There is a tradition of marrying girls at an early age that has been going on since ancient times so as not to become a 'spinster (UI Gender Study and KPPPA, 2016). A study conducted by the Criminal Justice Reform Institute (ICJR) and the Indonesian women's coalition in 2016 in three religious courts showed 97% of child marriage dispensations were granted by judges. One of the considerations given by the judge is that marriage is given to "prevent harm" 92%, because children are dating 98% and have aqil baligh 91%.

The 2016 Rumah KitaB Foundation's findings in its research in 5 districts include changes in living space and socio-ecological environment, the loss of the role of parents due to migration to cities or becoming migrant workers abroad, the logical consequence of the increasingly rigid moral values due to the loss of the power of local leaders in economic resources and village assets, and the weakening of traditional power, legal contestation between state law and religious law (fiqh) (Child Marriage Monograph, 2016).

Likewise, the situation of information and education about reproductive health is still lacking so as to lead to misguided understanding of sexuality and many of which lead to child marriage (Djamilah and Kartikawati 2014).

II. METHOD

This study uses a cross-sectional design, with primary data sources taken from Cugenang District because it has the highest prevalence of child marriages for 10 children in Cianjur (7.5%) in Cianjur Regency. Cugenang District has 11 villages. The population of this study are women and men who have marriages, both registered and unregistered who reside in the District of Cugenang. The sample of the study is 245 respondents consisting of 216 women and 29 men. randomly probability proportional to size from 11 selected villages that meet the inclusion criteria: the high number of child marriages based on KUA data and anecdotal data that is not recorded, Data collection was carried out on July 2-15, 2020 using questionnaires by recruiting village cadre enumerators who were trained in advance, data collected was edited by checking the filled instruments, coding data, then entering data into data processing systems, and cleaning up data by re-checking the completeness and correctness of the data. The dependent variable is child marriage while the independent variables are Education, tradition / culture, religious views and access to reproductive health information. Data on child marriages is obtained by asking the age of the first respondent to have a marriage. This is confirmed by KUA data of Cugenang Subdistrict and data from the Village Head. Other data were obtained by filling in the questionnaire. Data analysis was performed using the STATA program (v.13, StataCorp), all variables were processed by calculation and categorization. To assess the dominant factor in this study is influenced by the odds ratio (OR) and 95% confident interval (CI) using multivariate logistic regression analysis.

III. RESULTS

Tabel 1 Responden Characteristic

Variable	N	%
Sex		
Male	29	11.84
Female	216	88.16
Age of responden		
≥ 18 years old (18 – 49 years old)	243	99.18
< 18 years old	2	0.82
Age of first time pregnant		
≥ 20 years old	127	51.84
< 20 years old	118	48.16
Numbers of birth		
No children	51	20,82
1-2 children	184	75,10
≥ 3 children	10	4,08
Working Status Before Marriage		
Work	142	57,96
Not work	103	42,04
Marriage legal status		
Registered at KUA	166	67,76
Not Registered at KUA	79	32,24

Respondent characteristics (table 5.4) show that 88.16% of respondents were 216 women. While male respondents were only 11.84% or 29 people. Age of respondents at the time of the study 99.18% was the age range of 18 years - 49 years as many as 243 people, for ages under 18 years, only 2 people. The first pregnancy was categorized ≥ 20 years 51.84%, which was 127 people while the category <20 years was 118 people or 48.16%.

The number of children owned by respondents to date is 51 respondents who have no children or equal to 20.82%, 184 respondents have 1-2 children by 75.10%, and respondents who have ≥ 3 children are 10 people by 4.08% . The employment status of respondents prior to marriage 142 people worked or 57.96% and 103 people did not work or 42.04%. The legality of marital status is no less

interesting to show that respondents whose marriages were registered at KUA were 166 people or 67.76% while those not registered at KUA were 79 people or 32.24%.

Table 2 Univariate Analysis of Factors Affecting the Occurrence of Child Marriage in Cugenang Subdistrict, Cianjur District.

Variable	N	%
Child Marriage		
No (≥ 18 years old)	173	70,61
Yes (<18 years old)	72	29,39
Education		
High	67	27,35
Low	178	72,65
Family Economic		
High economic	40	16,33
Low economic	205	83,67
Tradition/culture		
Not Influence by tradition	131	53,47
Influence by tradition	114	46,53
Religious Perspectives		
Good	101	41,22
Not good	144	58,78
Reproductive Health Information Acces		
Good	110	44,90
Not good	135	55,10

The results of table 2 show the total number of respondents who married children (married under the age of 18) as many as 72 people. While respondents who did not have child marriages (having marriages the same as over the age of 18 years) were 173 people. Resulting in the proportion of child marriages in Cugenang District of 29.39%. The last education completed by the high category respondents (high school and college) was 67 people, while the low category education (elementary and junior high school) was 178 people. The proportion of respondents in the high education category was 27.35% and the low category was 72.65%.

The family economy before marriage, which means the economic condition of the parents of the respondents at the time before marriage with a high category economy (above the district minimum wage (UMK)) of 40 people, while the low category economy of 205 people. The proportion of the family economy in the high category is 16.33% and the low category is 83.67%. The results of the analysis of tradition / culture that states are not affected by tradition / culture as many as 131 people and who states are affected by culture of 114 people. The proportion not affected by culture was 53.47% and the proportion affected by culture was 36.53%. Religious views that have been successfully analyzed are those who have a good understanding of 101 people while those who have a bad understanding are 144 people. The proportion of understanding is good at 41.22% and the proportion of understanding is not good 58.78%.

Table 3 Bivariate Analysis of Variable Factors Influencing the Occurrence of Child Marriage in Cugenang Subdistrict, Cianjur Regency

Covariat Variable	Child Marriage Category				PR	95% CI	P-value
	CM		Not CM				
	n	%	n	%			
Education							
Low	63	35,39%	115	64,61%	2,634	1,39-4,994	0,0008
High	9	13,43	58	86,57%			
Family Economic							
low	59	28,78	146	71,22	0,885	0,54-1,45	0,6367

economic high economic	27	67,50	13	32,50			
<hr/>							
Tradition/culture							
Influence by tradition	34	29,82	80	70,18			
Not Influence by tradition					1,028	0,69-1,52	0,8887
<hr/>							
Religious Perspectives							
Not Good	37	25,69	107	74,31			
good	35	34,65	66	65,35	0,741	0,50-1,09	0,1297
<hr/>							
Reproductive Health Information Access							
Not Good	50	29,75	22	70,25	1,851	1,2-2,85	0,0036
Good	85	29,93	88	70,97			

Based on the results of the analysis above table 3, the Relationship of Respondent Education with Child Marriage the respondents obtained PR value of education 2,634 (95% CI 1.39-4,994), meaning that respondents who have low education risk 2,634 times to do child marriage compared to respondents who have higher education. The association was statistically significant as indicated by the p value of 0.0008 (<0.05). Relationship of Family Economy with Child Marriage obtained a family economic PR value of 0.885 (95% CI 0.54-1.45), meaning that respondents who have a low family economic level risk of 0.885 times to do child marriage compared to respondents who have a high family economic level. The association was not statistically significant as indicated by the p value of 0.6367 (> 0.05).

Relationship of Tradition / Culture with Child Marriage obtained a tradition / culture PR score of 1.028 (95% CI 0.69-1.52), meaning that respondents who were affected by tradition / culture risked 1,028 times to conduct child marriage compared to respondents who were not affected by cultural traditions. The association was not statistically significant as indicated by the p value of 0.8887 (> 0.05). The Relationship between Religious Views and Child Marriage is obtained PR value of religious views 0.741 (95% CI 0.50-1.09), meaning that respondents who have a religious view are not good which means approving religious views that support child marriage at 0.741 times the risk of child marriage compared respondents who have a good religious view that does not agree with religious views that support child marriage. The association was not statistically significant as indicated by the p value of 0.1297 (> 0.05). Relationship of Health Information Access to Child Marriage obtained PR value of access to reproductive health information 1,851 (95% CI 1,20-2,85), meaning that respondents who have access to reproductive health information have less risk of 1,851 times to have child marriage compared to respondents who have access to information good reproductive health. The association was statistically significant as indicated by the p value of 0.0036 (<0.05).

Table 4. Full Model of Factors Encouraging Child Marriage

Variable	OR	95% CI		P-value
		Lower	upper	
Reproductive Health Information Access	2,300	1,250	4,232	0,007
Education	3,869	1,699	8,810	0,001
Family Economic	0,512	0,225	1,167	0,112
Tradition/culture	0,796	0,438	1,447	0,456
Religious Perspective	0,633	0,353	1,134	0,125

In table 4. A full model of the results of the bivariate analysis is included in the multivariate logistic regression analysis. To control the effect of confounding variables from the results of the full model, the selection is done by looking at the difference in PR for the main variable by removing the confounding candidate variables one by one.

Table 5. Final Model of the Factors Encouraging Child Marriage

Variable	B	SE	Nilai p	OR	95% CI
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Reproductive Health Information Access	0,755	0,304	0,013	2,128	1,172-3,861
Education	1,168	0,395	0,003	3,127	1,482-6,986

Table 5 above shows the final modeling results from the multivariate test. Based on the results of the logistic regression test, the dominant and significant relationship is reproductive health information access variable and Education variable. Education variable has OR 3,127 (1,428-6,986) which means low education has a risk of 3,127 times to conduct child marriage. Followed by the variable access to reproductive health information has an OR 2.128 (1,172-3,861) which means that respondents who have access to reproductive health information have less risk of 2.128 times to have child marriages compared to respondents who have access to reproductive health information both after controlling the variable Education of respondents before having a marriage.

DISCUSSION

This study found that the proportion of child marriages was 29.39%. The final model of multivariate analysis shows that the dominant factor that drives child marriage is education that has an OR 3.127 (95% CI: 1,482-6,986). The education factor is more dominant in encouraging child marriages compared to other factors in this study, namely access to reproductive health information, family economics, cultural traditions, and religious views. This is in line with research conducted by Ma'mun, (2015) which shows that young adolescents with low education have an OR risk of 2,846 times to get married early than young adolescents with high education. Susenas 2018 data shows that higher levels of educational attainment for those married above 18 years for women, nearly half (45.56 percent) who marry at an adult age complete high school (high school). The average length of schooling for women and men aged 20-24 years who get married after the age of 18 years is higher than those who get married before the age of 18 years.

Child marriage is a complex problem, so it is not only the dominant factor that must be a concern but also other factors, as found in this study. Access to reproductive health information has an OR of 2.128 (95% CI: 1,172-3,861). BPS 2020 data reveals that barriers to adolescents obtain information, especially related to reproductive health from formal institutions, for example in schools, so that they do not know reproductive health information early on. This is supported by Djamilah and Kartikawati 2014 research reveals that adolescents often do not know the consequences of having sex, or the function of contraception.

Another factor in this study is the tradition / culture that encourages child marriages to have an OR of 0.796 (95% CI: 0.438-1.474) even though the value is not statistically significant, this factor is a major driver in regions in Indonesia. This is corroborated by research Benedicta, et al, 2017 states that how many traditions that perpetuate child marriages are still found in Indonesia, such as Merariq in Lombok where women are 'rushed' to men's homes to be married. Religious views are not unlike tradition / culture, in this study having an OR 0.633 (95% CI: 0.535-1.134) statistically insignificant but a significant driving factor towards child marriage, this was confirmed by the results of the Rumah KitaB research (unpublished) 2019 and 2020 in three urban areas shows that child marriage is high due to religious conservatism and in Sumenep shows that socio-religious views are used as reasons for child marriage.

Finally, family economic factors that are often suspected to be a driving factor or called poverty, in this study found OR 0.512 (95% CI: 0.225-1.167) although statistically it is not too significant but the family economy is one of the drivers of child marriages. This is as found in the UNFPA study, 2018 Child marriages often occur against the background of parents who want to improve family economic well-being. For poor households, most girls are seen as an economic burden and marriage is seen as a solution to escape poverty. However, the March 2018 Susenas shows a slight difference in the level of poverty between women aged 20-24 years who are married before the age of 18 years (13.76 percent) and those who are married above the age of 18 years (10.09 percent), which means the economy is correct the family is a driver of child marriage, but not the only one, as well as those found in the study.

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VI. CONCLUSION

The analysis in this study shows that education is one of the dominant factors in encouraging child marriage in Cugenang District, Cianjur Regency, West Java Province, Indonesia. This is in line with the HDI of Cianjur 64.62 which is ranked 21 out of 21 districts / cities in West Java. This means that the HDI of Cianjur Regency is the lowest in West Java Province. One indicator of HDI is the old school expectation rate, where in West Java reached 12.42 years, while in Cianjur in 2018 it only reached 6.93 years.

Factors driving the occurrence of child marriages are very complex in addition to education, tradition / culture, religious views, and family economics and there are still many other factors not examined. In connection with the complexity of the problem, to prevent it, it must involve all cross-sectors related not only the government, but also the involvement of non-formal figures in the community such as traditional and religious leaders, parents and children themselves. For further research it would be better if the variables to be studied were enriched and with different research designs so that it could illustrate richer results. The findings of this study add to global evidence that the dominant driver of child marriage can be prevented by keeping children in school, this will have a positive impact on the country, namely increasing the human development index. From this research it is necessary to encourage policy makers and the application of integrated child marriage prevention programs to schools or other educational institutions so that children can continue their education to a higher level for at least 12 years.

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Ethical Considerations

This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Universitas Indonesia (Ket- 390/UN2.F10.D11/PPM.00.02/2020).

Competing of Interests

The authors declared that no competing interests exist.

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Fulani Herdsmen Crisis and the Socioeconomic Development of Benue State, Nigeria

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Abstract– Every government’s responsibility remains that of pursuing and sustaining the security and wellbeing of its citizens and its territory against internal and external aggressions. However, Nigeria experiences several political and socio-economic challenges and violent conflicts which threaten her socio-economic development, peace, and security. Youth restiveness and resource control struggles in the Niger Delta region, the neo-Biafran secessionist movement of the Indigenous People of Biafra (IPOB) in the southeastern region, and the Boko Haram’s mayhem in the northeast are quintessential cases of violent conflicts in Nigeria. Still, another internal security challenge is brewing in Nigeria’s Middle Belt region; epitomized in the Fulani Herdsmen communal clashes in the region. This study examined the political violence in Benue, Nigeria, to ascertain its impact on the sustenance of socioeconomic development and national security in Nigeria. It argued that several factors account for the crisis from climate change to desertification and ethnoreligious issues and that on the government seems less dedicated to solving the menace.

Keywords– Fulani herdsmen, development, national security, conflicts, Benue State.

I. INTRODUCTION

Every government’s responsibility remains that of pursuing and sustaining the security and wellbeing of its citizens and its territory against internal and external aggressions. However, as Duke, Agbaji and Bassey (2017) purported, since her independence from Britain on October 1, 1960, Nigeria experiences several political and socio-economic challenges and violent conflicts which threaten her socio-economic development, peace, and security. Youth restiveness and resource control struggles in the Niger Delta region, the neo-Biafran secessionist movement of the Indigenous People of Biafra (IPOB) in the southeastern region, and the Boko Haram’s mayhem in the northeast are quintessential cases of violent conflicts in Nigeria. Still, according to SB Morgen Intelligence (2015:4), “another internal security challenge is brewing in Nigeria’s Middle Belt region.” This is the menace of communal violence epitomized in the Fulani Herdsmen communal clashes in the region.

Benue State is a largely Tiv community in the Middle Belt suffering, in alarming proportions, from the jeopardy posed by the Fulani Herdsmen in the different locations they migrate to for purposes of grazing their cattle. Some scholars like Akevi (2014) and Ubelejit (2016) posited that the herders’ perpetuated violence is Nigeria’s second greatest security challenge. According to Ubelejit (2016), the herders’ tendency to occupy the land and farm owners of the sites they graze their cattle increases daily as they update their arsenal with highly sophisticated weapons. Fulani herdsmen violence poses a serious threat to the legitimacy of Nigeria’s federal system. The violence in the Tiv community has heightened to the point where it can be said that socioeconomic improvements have been sacrificed on the altar of underdevelopment. These tragic conflicts carry with them additional dangers that if not checked, borrowing from Oravee (2015) may spread and result in a Tiv and Fulani Herdsmen holocaust. To that extent, therefore, this study examines the phenomenon of political violence in Benue, Nigeria, to ascertain the impact this is having on the sustenance of socioeconomic development and national security of the area.

II. STATEMENT OF THE PROBLEM

Benue is one of Nigeria’s most resource-endowed States with a large landmass. Popularly called ‘Nigeria’s Food Basket’, Benue’s vast and fertile landmass ordinarily, ought to be an advantage as it can fast-track rapid socio-economic development, especially in terms of space for agricultural practices; but the reverse seems to be the case, with the upsurge in violent crimes in recent times. This affects the security of lives and property in the different communities of the State. Since the past decade, the major security challenge confronting the region is the Fulani herdsmen communal clashes. This unfortunate development is gradually killing Benue’s major

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industry, rice milling (Akighir, Ngutsav & Asom, 2011), thus, triggering an evolving national food crisis and upsetting the socioeconomic structure of the community – increasing poverty and unemployment. Also, the crisis disrupts crop planting, animal rearing, and flow of (agricultural) investments since no investor would prefer to invest in a crisis-ridden community. This is bad for economic security because when businesses are shut-down, the wealth the economy generated per individual (i.e., nominal GDP per capita) diminishes as well (Chandra & Bhonsle, 2015).

More so, figures of the number of people who have lost their lives and are displaced, and the amount of property and livestock lost as a resultant impact of the Fulani herdsmen conflagrations in Benue State is frightening. Thousands of people have become refugees in their own country leading to as many social problems as starvation, illiteracy, high mortality rate, and spread of diseases.

Given the foregoing, the study can be summarized in the following questions:

1. What is the nature of political violence in Benue State?
2. What are the impacts of political violence in Benue State?
3. What strategies is the government applying to curtail the menace of political violence in Benue State?

III. LITERATURE REVIEW

While Nigeria and the world focus attention on the actions of the movement known as Boko Haram, another internal security challenge is brewing in Nigeria's Middle Belt region and Benue State in particular. This security challenge is epitomized in the Fulani herdsmen clashes with the rural farming communities in Nigeria's north-central region. According to SBMI (2015), unlike the more high profile and internationally recognized Boko Haram insurgency, the Fulani herdsmen violence in the Middle Belt is under-reported in both the domestic and international media, and the government's response to it has been a sort of denial that this conflict exists, with senior government officials preferring to focus on Boko Haram.

Owing to the seasonal southward migration of Fulani herdsmen, they usually enter into contention with indigenous people of the Middle Belt region for farmland. This contention bordered on the destruction of their crops by the cattle of the Fulani herdsmen, and the theft or rustling of livestock by the farming communities. Inevitably, while the natives complained and attacked the herders, the herders recourse to organized violence. This marked a transition away from the original lifestyle of the herders. Akinyetun (2016) called this transition the change of occupational tactics: staff to a gun. Akinyetun (2016:39) explained that:

The Fulani in the course of carrying out their pastoral nomadic activities has been seen to have changed tactics from mere land grazing to barrel-induced-land grazing. In short, the spate of killing and kidnappings as perpetuated by the Fulani nomads calls for great concern before this fetus is given birth to and culminates into another sect, or plunges the country into a primitive, primordial and pedestrian state of nastiness, solitary and brute.

The attacks by the farming communities and reprisal attacks by the herders led to several fatalities on both sides. Ubelejit (2016) argued that the communal conflicts orchestrated by Fulani herdsmen in Benue State claimed the lives of more than 5000 victims in the first half of 2014. The herdsmen sacked more than 100 communities; throwing thousands of refugees into internally displaced person camps located in Makurdi. Also, Abdulkarkindo and Alupsen (2017) opined that a total of 853 people lost their lives just in the period between January 2014 and March 2014 alone. Of the 853 deaths: Fulani herdsmen claimed to have lost 214 people (in addition to 3200 cows), an estimated 633 Tiv people were killed (excluding women and children who died later in camps), and six government soldiers were also killed.

The killings were indiscriminate, with everyone as targets, regardless of age, gender or class. This is because their combat readiness and sophistication gives them the courage not only to attack host communities but to confront and attack constituted authorities that are heavily protected with state of the art military convoys. A case in point was the event where the convoy of the Governor of Benue State, Gov. Gabriel Suswan, was ensnared and attacked by herdsmen on his way from Tse-Akanyi village in Guma Local Government Area where he went to commiserate with the victims of conflict with Fulani Herdsmen (Ubelejit, 2016; SBMI, 2015).

The fundamental question now is: how do these herders get their weapons? From the information derived from the interviews organized with victims, security officials and senior government functionaries, Abdulkarkindo and Alupsen (2017) noted that the herdsmen were involved in transporting small arms into Benue State using cows and donkeys. Sometimes these weapons were hidden in sacks of grain, beans and rice transported on the back of donkeys as they move from place to place. They further added that according to some military sources, some of the herdsmen use Hilux Jeeps and motorcycles to carry out their attacks. The weapons in use include AK-47 assault rifles, homemade rifles, handguns and Molotov cocktails (Abdulkarkindo & Alupsen, 2017; Akinyetun, 2016; ICG, 2017).

Furthermore, it is believed that there are some religious connotations to the violence. Abdulbarkindo and Alupsen (2017) were of the view that:

Thousands of churches have been destroyed and thousands of Christians have been killed, displaced or injured. Like conventional terrorist organizations, Islamic radical sects and jihadi groups, the ideology of the Hausa-Fulani Muslim herdsmen goes beyond the mere feeding of sheep and the search for greener pastures. It is inevitably linked to the program of Dawah (the propagation and expansion of Islam). It is based on the ideology... "Komai na Allah ne. Ko wane fili na Allah ne, ba naku ba, ba na kafirai ba, na Allah ne" (Translation: Everything belongs to Allah. Every piece of land belongs to Allah and not you, it is not for you infidels but Allah). The use of the name Allah supports specifically the Islamic concept of God, and the obligation for Muslims to do his will.

Evidence suggests that Christians are being targeted for violence on the account of their faith. According to the fieldwork by the Africa Conflict and Security Analysis Network (ACSAN) and the data collected from Benue State Emergency Management Agency (BSEMA) and Young Professional Association in Makurdi (in Abdulbarkindo & Alupsen, 2017), the estimated number of Christians killed and injured in Benue State between 2014 and 2016 were 4194 and 2597 respectively. The same groups reported that the estimated number of Christian homes and churches reported damaged or destroyed in Benue State between 2014 and 2016 were 195,576 and 30 respectively.

The Fulani herdsmen crisis, deemed only less deadly than Boko Haram, the Islamic State (IS) and Al-Shabaab globally (David, 2016), affects the socio-economic development of the Nigerian State. According to the studies carried out by Nweze (2005), Okereke (2012), Bello (2013) and Ajibefun (2018), the major social effect of the menace of Fulani herdsmen are loss of human life, sexual harassment of human life, small arms proliferation, sour national social relationship, and high cases of rape, among others. Likewise, Ajibefun (2018) discovered that the major implications of the Fulani herdsmen menace were the reduction in output and income of farmers/nomads, loss of produce in storage, displacement of farmers, scarcity of agricultural products, loss of house and properties and infrastructural damages. Likewise, in a 2015 study carried out by Mercy Corps (cited in ICG, 2017), the Fulani herdsmen violence accounted for the federal government's loss of \$13.7 billion in revenue annually because of herder-farmer conflicts in Benue, Kaduna, Nasarawa and Plateau states. The study further found that on average, these states lost 47% of their internally-generated revenues.

Duke and Agbaji (2018) have argued that violent conflicts lead to refugee crises in the affected regions. McGregor (2017) opined that the violence led to poor security of human and property. With little protection offered by state security services against the incessant violence, many farmers have begun abandoning their plots to seek safety elsewhere, leading to food shortages, depopulation of fertile land, and further damage to an already fragile economy. So, Isola (2018) argued that those remaining in the villages are afraid to travel to farms in remote locations due to fear of violence from herdsmen. The implication of this situation is ominous on food production. There are already reports that prices of foodstuff have increased in some of the affected states while refugee problems have escalated.

The reasons for this violence are myriad. They range from encroachment on farmland, cattle rustling, scarcity of freshwater, age-long disagreements, to climate change. Be that as it may, this has created a volatile situation where the herders who were known to only walk around with bows and arrows and daggers now carry sophisticated weaponry like AK-47 and assault rifles; using these to raid villages and agrarian communities leaving a high death toll and massive displacement of denizens of attacked and neighbouring communities in the wake of their attacks. Owing to the foregoing, the Global Terrorism Index (2015) described the herdsmen as the world's fourth deadliest militant group.

According to Abass (2012), the major source of tensions between pastoralists and farmers is economic, with land-related issues accounting for the majority of the conflicts. This can then be situated within the broader context of the political economy of land struggle, traceable to burgeoning demography in which there is fierce competition for fixed space to meet the demands of the growing population of man and animal (especially sheep, goats and cattle) alike.

Nwekede, Nwankwo, Aro and Dauda (2018) mentioned that the causes of the herders-farmers clashes involve several factors which they explain to include the maladministered government's pastoralist policy. This involved the usurpation of designated grazing reserves across the 19 Northern states by politicians who saw the reserves as lucrative, thereby, creating a shortage of land, water and other resources. Others problems include environmental degradation arising from desertification and the shrinking of Lake Chad Basin which forces many pastoralists' communities to move further into areas outside the regular pastoral routes. Also, existing cattle rustling militias and other criminal elements prompt the proliferation of small and light weapons leading to bloody herders-farmers attacks and stimulating allegations that the herders have links to Boko Haram, ISIS, and Al-Shabaab (Nwekede et al, 2018).

Furthermore, Ahmadu and Ayuba (2018) classified the causes of violence into two: remote; and immediate causes. The remote cause of violence between herders and farmers can be seen in the general deteriorating fortunes of pasture in some parts of Sub-Saharan Africa since the early 1990s. according to Ahmadu and Ayuba (2018:35), this cause arises from:

...the effects of desertification, land degradation, unstable rainfall and other climatic factors, 'pushed' the Fulani pastoralist to abandon their respective traditional ecological range in the neighbouring countries of Chad, Niger and Cameroon republics, and moved inwards into Northern part of Nigeria. This led to increasing demand for land, water and pasture. Besides, major agricultural expansion programs (Fadama Program and River Basins irrigation projects) also contributed to shrinking lands for both pastoralism and sedentarism which led to competition over limited land and pastures.

On the other hand, the immediate causes include the deliberate attitudes of farmers and herders alike towards themselves. For instance, the herders contaminate water by dragging their cattle into water ponds while farmers poison the water ponds with harmful insecticides intentionally meant for killing herds to prevent pastoralists from contaminating their only source of water. Another point is cattle rustling and violent attacks on the herders by criminal elements who view them as invaders of the host communities. This has resulted in the herders carrying sophisticated arms and ammunition to protect themselves and their cattle. Given all of these, Ahmadu and Ayuba (2018) believe that group solidarity – in the form of collective action to defend and attack – is the major precipitator of violent acts between herders and farmers.

More so, while seeing the rainy season as the intense period of clashes between the herders and farmers owing to the availability of arable land, Imo (2017:49) identifies other factors that cause violence to include:

climate changes, the migration further south, the growth of agro-pastoralism, the expansion of farming on pastures, the invasion of farmlands by cattle, assault on non-Fulani women by herders, blockage of stock routes and water points, freshwater scarcity, burning of rangelands, cattle theft, inadequate animal health care and disease control, overgrazing on fallow lands, defecation on streams and roads by cattle, extensive sedentarisation, ineffective coping strategies, ethnic stereotyping, and the breakdown of conflict intervention mechanisms as the root causes of such violence in rural areas.

IV. THEORETICAL FRAMEWORK

This study adopted Johan Galtung's (1969) models of conflict, violence and peace. He opined that conflict could be viewed as a triad construct, with a manifest and visible 'behavioural' component (B) linked to two latent and invisible 'Attitude' or 'Assumption' (A) and 'Contradiction' (C) components. Thus, we can only talk about having a violent conflict when all components are available. Contradiction refers to the underlying conflict situation, which includes the actual or perceived 'incompatibility of goals' (and ways of attaining the goals) between the conflicting parties generated by what Galtung (in Ogo-Oluwa, 2017) called a 'mismatch between social values and social structure'. Attitude or assumptions includes the 'perceptions and misperceptions, the fear and the prejudice held by the antagonistic groups. These attitudes tend to be negative, develops demeaning stereotypes against each conflicting groups, and are often influenced by emotions such as fear, anger, bitterness and/or hatred. For Demmers (2012), the manifest, empirical and observed side, behaviour, is the more spectacular and visible of the three and the one that attracts the most attention owing to its characteristic nature. It involves all-out threats, coercion, onslaught, violence, discrimination, and mayhem perpetrated by antagonistic groups.

According to Ogo-Oluwa (2017), Galtung saw 'conflict' as a dialectical and dynamic process in which structures, attitudes and behaviour are constantly changing and influencing one another. As the dynamic develops, it becomes a manifest conflict formation, as parties' interests clash or the relationship they are in becomes oppressive. Parties then organize around this structure to pursue their interests. This dialectical nature of violence is captured by Demmers (2012):

A conflict spiral may, for instance, start in C. Let us say someone's access to land is blocked by someone else (C). This may be experienced as frustration (A), and this frustration may lead to aggression (B). In return, aggressive behaviour may bring a new contradiction into the relation (for instance, the aggressive behaviour of the frustrated party may be incompatible with the other party's concept of happiness). Hence, we have a new C, which may give rise to a new round of attitudes and behaviours, which may lead to new contradictions and so on. Violence breeds violence, and we may see an escalatory dynamics that runs its course like a fire: only stopping when the house is burnt down. Galtung describes how the parties may burn out in the A corner from emotional exhaustion, or in the B corner from physical fatigue. However, A and B may also be restrained, and the contradiction may be superseded.

The relevance of this theory for the study is that it creates an understanding of the fact that the major contradictions or conflict of interest between farmers and Fulani herdsmen, on the one hand, are the destruction of farmlands, cattle's grazing and eating up farmer's crops, and on the other hand, the killing and rustling cattle's. This depicts the 'C' component of Galtung's analysis. These contradictions stand in the way of peaceful coexistence of the herders and the farmers resulting in the development of assumptions and attitudinal dispositions which can fuel clashes. In this vein, the ethno-religious category of the herder's prompted the farmers to perceive the herders to be Boko Haram affiliates, as such enemies or threats to their land that must be avoided or hindered from entering the land. This epitomizes the 'A' component of Galtung's analysis. Incompatible goals, measures for attaining the goals and stereotypic assumptions, suspicion, and resentments all interact to create a chain reaction of violent outbursts. The opposing groups now rally round their ideas of truism – their interests or goals – as justifications for the execution of violent conflagrations. According to Ogo-Oluwa (2017:6):

...this is when we see cattle's been killed by groups of farmers for destroying crops and herdsmen retaliate by destroying properties. They develop hostile attitudes and conflictual behaviour... And so the conflict formation starts to grow and intensify. As it does so, it may widen, drawing in other parties, deepen and spread, generating secondary conflicts within the main parties or among outsiders who get sucked in. This often considerably complicates the task of addressing the original, core conflict.

V. IMPACTS OF THE FULANI HERDSMEN VIOLENCE ON THE SOCIOECONOMIC DEVELOPMENT OF BENUE STATE, NIGERIA

Violent conflagrations between Fulani herdsmen and crop farmers in several Nigerian agrarian communities waning national insecurity. These violent conflicts impact the socio-economic and political development of the nation as well as the trends of relationships between different ethnic nationalities in Nigeria. One of the first consequences is the loss of human lives: Fulani herdsmen violence usually leads to the loss of human and animal lives. SB Morgen Intelligence (2015) reported that over 30 persons were reportedly killed in Kwande, Katsina-Ala and Logo Local Government Areas of Benue State when suspected Fulani mercenaries dressed in military uniforms sacked 6 villages in the three council areas. Likewise, 18 people were said to have been killed at Tse Ibor, Tombo and Mbawa all in Logo Local Government Area, while another 7 were killed at Anyiase near Kashimbila in Kwande local government area.

In the following month, as Burton (2016) recorded, between April 5th and 25th of 2016, 4 people were killed by Fulani militants in Benue State, about 17 people in Taraba and 40 people in Enugu State. For Oli, Ibekwe and Nwankwo (2018), while the Fulani herdsmen claimed to have lost 214 people in addition to 3,200 cows, the Tiv people reportedly killed are estimated to be 633 excluding children and women who died in ramshackle camps in 2014. They add that about 458 deaths recorded and over 350 communities owned by the Tiv people in Guma, Gwer-West, Makurdi and other towns at the border with Taraba state have been ravaged by the violent herders and community denizens are now living in IDP camps.

Furthermore, the destruction of crops and animal is widespread. According to Oli et al (2018), more than 40 million worth of crops is usually lost annually due to invasion of cattle in the Middle Belt and South-South regions of Nigeria. This has not only created an impediment to the survival of the host communities but has forced many crop-farmers to abandon farming for occupations with a lesser impact on the nation's GDP growth like Okada riding (commercial motorcycling) and other artisan work. For instance, the unfortunate development of the Fulani herdsmen crisis is gradually killing Benue's major industry, rice milling (Akighir, et al, 2011), thus, triggering an evolving national food crisis and upsetting the socioeconomic structure of the community. Also, the crisis disrupts crop planting, animal rearing, and flow of (agricultural) investments since no investor would prefer to invest in a crisis-ridden community. Little wonder, in his analysis of the herders-farmers crisis, Imo (2017) revealed that the nomadic herdsmen suffer from material damages when the crop farmers inflict physical injuries on the cattle by using cutlasses, spears or guns or by poisoning the cattle.

More so, the violence has led to a humanitarian crisis and the displacement of people. The herders-farmers violence accelerates the massive displacement of the citizenry who attempt to flee for their lives the predatory and violent attacks perpetrated by the marauding herders. Thousands of people have become refugees in their own country leading to as many social problems as poverty, starvation, high mortality rate, and spread of diseases. There were reports of displaced farmers and herdsmen alike. Added to this are the cases of human right abuses, torture, raping, and kidnapping occurring within affected communities. For instance, the herders were attacking, kidnapping, torturing and killing communities' denizens. A case in point is the capture, torture and gruesome mutilation of Mr John Anule of Adaka community of Benue State in 2014 (SBMI, 2015).

Still, the result of the herders-farmers violence at the social level leads to mistrust and unhealthy prejudice between the Fulani ethnic nationals and crop farmers of the host communities. Burton (2016) noted that a large proportion of the Fulani people are entirely nomadic without any form of military training. So, the atrocities of the violent herders rubs-off on the personalities of the non-violent

ones causing a large scale prejudice, suspicion, anxiety and clashes against the Fulani ethnicity. According to Oli et al (2018), some persons have cited a Fulani expansionist agenda as being behind these attacks resulting from mistrust. A Twitter hashtag to that effect, #MAFO (Movement Against Fulani Occupation) was launched and there were allegations of possible government collusion in this perceived expansionist agenda.

Furthermore, added to the economic impacts are the academic impacts. Duke et al (2016) wrote that UNESCO estimates that Nigeria is home to 45% of the global school drop-out population and has 10.5 million children out of schools. Taking a cue from this, it may be safe to state here that the farmers-herders violence is increasing these numbers today because of the shutting down of all the schools in some states in Nigeria thereby leading Nigeria to mass illiteracy. As Oli et al (2018) wrote:

...pupils and teachers ... were seen scattered in the premises under intense fear as herdsmen left their cattle to invade classrooms during learning session... That day's academic activities were not only truncated but also the psychological trauma experienced by the pupils that forcefully ran out of classrooms for fear of harm may not be quantified. The herders were seen roaming the school premises and they left their cattle to move freely inside classrooms until the late intervention of some security personnel (Oli et al, 2018: 36-37).

VI. GOVERNMENT'S EFFORTS TO ADDRESS THE FULANI HERDSMEN-FARMER CRISES

Anytime there is a massacre of people in a state by Fulani herdsmen, there is an outcry by Nigerians for the Federal Government to take action. According to Onwuka (2018), most times, there is only a verbal response from the government; a plea for people to live together in peace or a promise to arrest the perpetrators. But nobody gets arrested (Onwuka, 2018). Abdulkarkindo and Alupsen (2017) purported that the inaction of the Nigerian government towards Hausa-Fulani violence has allowed the culture of impunity to grow. In the absence of government security, some local communities decide to defend themselves against Hausa-Fulani herdsmen attacks. The government claims that the perpetrators of the massacres are unknown and that accounts for the inability to arrest anybody. But as Onwuka (2018) wrote, affected cattle herders groups always give reasons for their attacks. Onwuka (2018), reporting on the Fulani herdsmen attacks in Benue State in January 2018, quoted Mr Garus Gololo, Chairman, Benue State Miyetti Allah Cattle Breeders Association (which has President Muhammadu Buhari as its grand patron), who was interviewed by the British Broadcasting Commission (BBC):

"We weren't grazing. After the Benue government banned grazing, we were relocating to Taraba State through Nengere border town of Nasarawa State. They came and stole one thousand cows from us, so we retaliated and killed them'... Such comments show that the perpetrators of the acts are not unknown. They appear at peace meetings and disclose why they carried out their attacks on the concerned people. They go to TV and radio stations as well as newspaper houses to grant interviews to explain why they carried out their attacks. Usually [because] ... their cattle were stolen by the community."

The government's attitude towards the killings is not one that takes the clashes seriously. One can argue that the government sees the Fulani herdsmen crises as a mere misunderstanding that has little impact on the overall national security of Nigeria; a mere misunderstanding where the farmers are usually the aggressors and the herdsmen the victims whose actions are justifiably reactive to the farmers' hostilities. So, Abdulkarkindo and Alupsen (2017) added that critics blame the government for using double standards. For instance, the government placed a terrorist label, arrest, imprison and prosecute members of IPOB and deployed military forces against the Niger Delta Avengers. Yet, the government has refused to arrest or prosecute Hausa-Fulani herdsmen (Abdulkarkindo & Alupsen, 2017). Instead, there appears to be a policy-framework underway to establish grazing fields for the herdsmen. The Minister of State for Agriculture and Rural Development, Heineken Lokpobiri, reaffirmed the government's plans to establish cattle ranches as a lasting solution to prevent the frequent clashes between herdsmen and farmers in Nigeria. This proposal, however, has been rejected both by the affected states (chiefly, those in the south) and the herdsmen under the Miyetti Allah Cattle Breeders Association. According to the report by *Premium Times* (2018), the herdsmen insisted on having grazing reserves and routes.

More so, the proposal by the government has been the only significant attempt by the government to checkmate the Fulani herdsmen crises. But Abdulkarkindo and Alupsen (2017) described this as being seen by many as a tacit endorsement of the plans of the Hausa-Fulani herdsmen by authorities of the Nigerian government. They added that the government is not serious about ending the herdsmen-farmers clashes in Nigeria. This is epitomized in the fact that a large chunk of appointments into key offices, particularly key security offices that should protect the lives and property of all citizens, are dominated by Hausa-Fulani Muslims. This is, even more, worrying for Christians who are already victims of attacks by Hausa-Fulani Muslim herdsmen (Abdulkarkindo & Alupsen, 2017).

This perspective of being marginalized or dominated by a particular ethnoreligious and occupational group has led to state-led policy and legislative actions to quail the perilous attacks and bring about peaceful coexistence. In Benue State:

“an indigenous group is known as the “Movement Against Fulani Occupation” (MAFO) emerged to raise awareness about the atrocities of the Hausa-Fulani Muslim herdsmen against Christian communities. These efforts by MAFO led to the introduction of an Anti-Open Grazing and Establishment of Ranches Bill by the Benue State administration under Governor Samuel Ortom. The bill received accelerated passage in the State House of Assembly and passed into law in May 2017. If implemented successfully, there are hopes that this could be a viable way out of the current crisis and a model for other states, since the traditional way of grazing is no longer sustainable... the state intends to establish a special task force responsible for enforcing the Anti-Open Grazing Law (Abdulkarkindo & Alupsen, 2017: 40-41).

In all, the Buhari government’s actions, attitudes and body languages to the Hausa-Fulani Muslim herdsmen crises in the Middle Belt region have been largely lackadaisical. For Onwuka (2018), the government’s attitudes show that the government treats issues concerning the President’s kinsmen and people of his religion different from the way other groups are treated. The more people complain about this divisive attitude to governance, the more the government remains inactive and unperturbed.

VII. CONCLUSION

This study discussed the Fulani herdsmen crisis and its impacts on the socio-economic development of Benue State, Nigeria. This study argued that though the Fulani herdsmen crisis is slightly less dangerous than the Boko Haram insurgency, its repercussions are as grievous or threaten national security. Thousands have been killed, tens of thousands have been displaced from their homes, businesses have been shut down and farmlands and markets have been rendered desolate owing to the hostilities. It may not be out of place to opine that Nigeria is experiencing one of its biggest challenges to national security in the 21st century which if not accorded the necessary attention would destroy what is held as a cherished national value, i.e., maintaining a unified and geographically recognized state.

This study discussed the causes of the Fulani herdsmen crisis to include desertification, climate change and religious motivation, among others. Thus, one can argue that the hostilities are part of the Islamic expansionist agenda of extremist groups. Data of the number of Christians killed and churches razed are testimonies. Or as Abdulkarkindo and Alupsen (2017) opined, the control of grazing routes of Benue State by the Hausa-Fulani Muslim herdsmen will give them easy access to other communities in the south. Again, it will further cement the domination of the territories of minority Christian groups in the north. Likewise, this study discussed that the government seem to be reluctant to tackle the hostilities because even with the consistent attacks and killings, little or no perpetrator has been brought to justice.

Since the findings of this study show that the Fulani herdsmen communal crisis impacts negatively on the socio-economic development of Benue State, this study proposes that rice milling is Benue’s biggest industry. Hence, an enabling environment should be created by the government for rice millers so that more people will participate since rice milling alone generates income that can lead to about 34% reduction in the poverty level of those engaged in it. Likewise, the culture of impunity must be brought to an end. If foreign links are supporting Hausa-Fulani Muslim herdsmen activities, these must be investigated and exposed for further action to be taken. Additionally, there is a compelling need for dialogue and genuine reconciliation between the warring parties, so that enduring peace can be achieved. Lastly, research is required for adequately assessing whether victims of the violence have received any psychological rehabilitation.

APPENDIX

Appendix 1: The Local Government Areas of Benue State which have Experienced the Fulani Herdsmen Crisis

S/N	Name of LGA	Main ethnic group	Attacked/Not attacked by Herders	Headquarters
1	Ado	Idoma, Akweya	attacked	Igumale
2	Agatu	Agatu	attacked	Ogbagaji
3	Apa	Idoma, Abakpa	Not attacked	Ugbokolo
4	Buruku	Tiv	attacked	Buruku
5	Gboko	Tiv	attacked	Gboko
6	Guma	Tiv, Jukun	attacked	Gbajimba
7	Gwer-East	Tiv	attacked	Aliade
8	Gwer-West	Tiv	attacked	Naka
9	Katsina-Ala	Tiv, Hausa, Etulo	attacked	Katsina-Ala
10	Konshisha	Tiv	Not attacked	Tse-Agberagba
11	Kwande	Tiv, Nyifon	attacked	Adikpo
12	Logo	Tiv	attacked	Ugba
13	Makurdi	Tiv, Hausa	attacked	Makurdi
14	Obi	Igede	Not attacked	Obarike-Ito
15	Ogbadibo	Idoma	Not attacked	Otukpa
16	Ohimini	Idoma, Abakpa	Not attacked	Idekpa
17	Oju	Igede	Not attacked	Oju
18	Otukpo	Idoma	attacked	Utukpo
19	Tarka	Tiv	attacked	Wannune
20	Ukpokwu	Idoma	Not Attacked	Okpoga
21	Ukum	Tiv	attacked	Sankera
22	Ushongo	Tiv	Not attacked	Lessel
23	Vandeikya	Tiv	Not attacked	Vandeikya

Source: Abdulbarkindo and Alupsen (2017).

Appendix 2: Estimated Number of Christians Killed and Injured in the LGAs Under Consideration (2014 –2016).

S/N	Name of LGA	No. of Christians Killed	No. of Christians Killed
1	Agatu	967	1051
2	Gwer-East	15	21
3	Gwer-West	772	264
4	Makurdi	494	248
5	Guma	1426	606
6	Tarka	52	16
7	Buruku	25	0
8	Katsina-Ala	91	0
9	Logo	204	721
10	Ukum	42	24
11	Kwande	72	6
14	Obi	34	0
	Total for all LGAs listed above	4194	2957

Source: Abdulbarkindo and Alupsen (2017).

Appendix 3: Estimated Number of Christian Homes and Churches Reported Damaged or Destroyed Per LGA Under Consideration (2014 –2016).

S/N	Name of LGA	No. of thatched and tin-roof Christians homes damaged and destroyed	No. of churches damaged and destroyed
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1	Agatu	7,663	4
2	Guma	63,718	5
3	Gwer-East	447	0
4	Gwer-West	37,416	7
5	Katsina-Ala	11,399	1
6	Kwande	21,443	2
7	Logo	28,807	4
8	Makurdi	24,683	7
	Total for all LGAs listed above	195,576	30

Source: Abdulbarkindo and Alupsen (2017).

Appendix 4: Timeline of Fulani Herdsmen Attacks

S/N	Date	Place of incidents	Number of Victims
1	8/07/2012	Mash village in Riyon L.G.A, Plateau State	Senator Gyang Danton killed in a stampede, 50 victims attacked and injured
2	30/09/2012	Isoko North L.G.A. Delta State	1 person murdered in his farm
3	2/2/13	Inoli, Ologba, Olegeje, Olegede, Adana	Many lives lost Inminy and Abugbe communities in Benue State
4	23/4/13	Mbasenge community in Guma L.G.A. of Benue State	10 farmers were killed Benue State
5	7/5/13	Agatu	47 mourners killed and to policemen were also killed
6	14/5/13	Ekwo-Okpanechenyi, Agatu L.G.A. in Benue	40 persons killed
7	5/7/13	Nzorov, Guma L.G.A in Benue State	20 persons killed
8	31/07/13	Agatu L.G.A. in Benue State	8 persons and 112 cows were killed
9	7/11/13	Ikpele and Okpopolo communities in Benue	7 person killed and over 6000 inhabitants displaced
10	9/11/13	Agatu L.G.A. Benue State	36 locals were killed, seven villages destroyed
11	20/11/13	Guma L.G.A. Benue State	22 local killed, property destroyed
12	20/1/14	Agatu L.G.A., Benue State	5 soldiers and seven civilians killed
13	20/1/14	Adeke village in Benue state	35 persons killed
14	20-21/02/14	Gwer West L.G.A. Benue State	35 persons killed, 80, 000 persons displaced and sacked six L.G.A
15	24/2/14	TIV community along Naka Road, Makurdi	Eight people were killed
16	6/3/14	Kwande, Katsina/Ala and Logo L.G.A.s, Benue State	30 persons were killed

17	12/3/14	Ukpam village of Mbabaai, Guma L.G.A. of Benue State	Fulani Herdsmen 28 persons killed, property destroyed and several farms burnt
18	10/3/14	Umenger	Former Governor Suswam's convoy attacked. He and convoy managed an escape
19	12/3/14	Gbajimba, Guma L.G.A.	25 persons were killed, 50 injured, several properties destroyed.
20	25/3/14	Agena village	7 corpses recovered by police
21	29/3/14	Four villages in Agatu L.G.A.	19 people were killed and 15 others abducted
22	10/4/14	Shengev community in Gwer West L.G.A.	15 people left dead.
23	30/3/14	Agatu L.G.A.	19 locals were killed and 15 abducted.
24	10/4/14	Four villages in Ukamberaga/Tswarev ward of logo L.G.A.	Six people killed and property destroyed.
25	15/4/14	Obagaji, Headquarters of Agatu L.G.A	12 youths were left dead
26	10/9/14	Five villages in Ogbadibo L.G.A.	Several scores were left dead.
27	5/03/2014	Riyom L.G.A. in Plateau State-Gwon, Torok, Gwanwereng and Gwarim in Rim Districts of the L.G.A	Not less 10 people killed, over 100 houses burnt.
28	9/03/2014	Angwan Sakwai in Kaura L.G.A of Kaduna State	Over 57 people killed, Houses and property burnt.
29	5/04/2014	Galadima village Fulani Assistants (community leaders/residents in a meeting)	200 people killed and an unknown number injured
30	7/04/2014	Gassol in Taraba State	Several deaths and destruction of property.
31	19/04/2014	Benin-Asaba Expressway, Delta State	23 people killed.
32	21/07/2014	Vunokilang police station in Girei L.G.A. Adamawa. Four villages via: Demsare, Dikajam, Wunamokoh and Taboungo raided.	DPO killed alongside 30 other people in the attack, several houses and property burnt.
33	21/09/2015	Ilado village, Akure North of Ondo State	Former SGF, from Minister of Finance and chieftain of Afenifere, Chief Samuel Oluyemisi Falae was abducted N100m ransom demanded after 96 hours
34	21/09/2015	Lagelu L.G.A. of Oyo State (Iyana, Offa, Atagba, Lapata, Saki, ago-Are, Oje-Owode villages)	Valuables stolen, lives and property lost and villagers displaced
35	27/1/15	Abugbe, Okoklo, Ogwule and Ocholoyam in Aguta L.G.A.	Fulani Herdsmen 17 persons were killed.

36	30/1/15	Five villages in Logo L.G.A	9 persons were killed.
37	15/3/15	Egba village in Aguta L.G.A.	Over 90 locals, including women and children, were killed.
38	27/4/15	Three villages at Mbadwem, Guma L.A.G.A.	28 person were killed, houses and farmlands were razed.
39	11/15/15	Ikyoawen community in Turan Kwande L.G.A.	5 person killed and 8 injured.
40	24/5/15	Ukura, Gafa, Per and Ise-Gusa in Logo L.G.A	100 people were killed and several properties destroyed.
41	7/7/15	Imande Bebeshi in Kwande L.G.A	1 local was killed.
42	5/11/15	Buruku L.G.A.	12 persons killed and 25 others injured.
43	8/2/16	To-Anyiin and Tor-Ataan in Buruku L.G.A.	10 people were killed and over 300 displaced.
44	21-24/2/16	Agatu L.G.A.	Over 500 locals were killed and 700 displaced
45	9/3/16	Ngorukgam, Ise Chia, Deghkia and Nhumbe in Logo L.G.A	8 residents were killed
46	11/3/16	Agatu L.G.A.	Attack on the convoy of Senator David Mark. No casualty recorded.
47	13/3/16	Tarka L.G.A.	Six people including an APC youth leader were killed.
48	29/2/16	Edugbeho Agatu L.G.A.	11 persons killed including a Police Inspector.
49	10/3/16	Obagaji Agatu L.G.A.	Two persons killed.
50	5/3/16	Agatu L.G.A.	Houses burnt. Security forces prevented killings.
51	18/02/2016	Agatu L.G.A., Benue State comprising of communities such as Aila, Akwu, Adagbo, Okokolo, Ugboju, Odugbeho, Ogbaulu, Egba and Obagji.	Over 300 persons were killed. Houses, schools, health centres and worship centres were razed down
52	18/02/2016	Okokolo village, Agatu L.G.A. of Benue State	Five persons killed.
53	12/04/2016	Gashaka L.G.A. of Taraba State	15 persons killed.
54	25/04/2016	Nimbo in Uzo-Uwani L.G.A. of Enugu State made up of seven villages	About 40 persons reportedly killed, over 2000 people were displaced, Houses and churches destroyed.
55	16/06/2016	Ossissa community in Ndokwa East L.G.A. of Delta State	A 45-year old renowned farmer was shot.
56	20/07/2016	Communities in Benue State such as Ugondo, Fulani Herd Turan, Gabo	At least 59 Deaths were recorded.

		Nenzev, in Logo L.G.A	
57	13/10/2016	Kagoro Gidan Waya road in Kaura L.G.A. of Kaduna State	Two police officers were killed. Two other police officers injured
58	15-16/10/2016	Godogodo Area of Southern Kaduna in Jama'ah L.G.A.	20 people killed.
59	14/11/2016	Abam community of Arochukwu L.G.A. of Abia State	Several people killed and others sustained various degree of injuries
60	15/10/2017	Bassa L.G.A, Nkyie DONGHWRO village in Jos, Plateau State	26 people killed, houses and property destroyed.
61	24/1/17	Ipiga village in Ohimini L.G.A.	15 persons were killed.
62	2/3/17	Mbahimin community, Gwer East L.G.A.	No fewer than 10 people were killed in a renewed hostility.
63	11/3/17	TIV community, Mkgovur village in Buruku L.G.A.	Seven people were killed
64	8/5/17	Ise-Akaa village, Ugondo Mbamar District of Logo LGA	3 persons were confirmed killed.
65	13/5/17	Three communities of Logo L.G.A. Benue State	18 persons killed
66	09/12/17	Omala L.G.A. in Kogi State	One person killed.
67	02/01/18	Guma and Logo L.G.A. in Benue State.	49 persons killed, several homes burnt down, farms, crops and property destroyed.
68	5/01/18	Numan L.G.A. in Adamawa State	Several people killed.
69	6/01/18	Tombu village in Logo L.G.A. of Benue State	11 persons killed.
70	04/01/18	Dan-Anachatowa in Gassol L.G.A. of Taraba State, Jandeikyula village in Anyam Kwever, Wukari L.G.A.	12 persons killed, and several others wounded
71	10/01/18	Lau L.G.A. of Taraba State	55 persons killed and several others wounded.
72	14/01/18	Dangaji village in Nirnin Gwari L.G.A. of Kaduna State	10 people killed, several others injured, property looted, houses razed down.
73	14/01/18	Unguwar Gajere Kutemeshi District of Fu Birnin Gwari L.G.A. of Kaduna State	10 persons killed.
74	16/01/18	Oke-Ako and Irele communities in Ikole Fulani Herdsmen L.G.A. of Ekiti State.	1 person (Babuba Dengi) killed.
75	19/01/18	Ovwor-Olomu in Onicha-Olona community in Aniocha North and Ugheli South Areas of Delta State	At least one persons killed, 3 persons injured one woman raped
76	20/01/18	Majiankhai village, Barkin Ladi L.G.A.,	A hunter identified as Daniel Wallam was

		Plateau State.	killed.
77	21/01/18	Kikon village, Bachama community, Numan L.G.A. of Adamawa State.	Many people killed, many homes destroyed in a violent reprisal attack
78	21/01/18	Ilado village in Akure North L.G.A. of Ondo State	The five-hectare oil Pal plantation farm of a Former Secretary to the Government of the Federation, Chief Olu Falae was burnt down
79	26/01/18	Guma L.G.A. in Benue State.	2 persons and a police officer killed.
80	29/01/18	Guma L.G.A. in Benue State	NNPC Staff killed, 2 others seriously injured.
81	01/02/18	Kagoro village, Kaduna State.	6 persons killed, several others injured and many houses burnt and property destroyed.
82	26/01/18	Huke village, Miango District in Bassa L.G.A. of Plateau state.	3 persons killed (Ahmadu Hwei (male 100yrs), Odo Hweie (male 90yrs) and Gado Kondo (male 70yrs), village Houses burnt and several properties destroyed
83	05/02/18	Waku village in Yogbo community Guma L.G.A. of Benue State	2 persons killed.
84	03/02/18	Yogbo community in Guma L.G.A. of Benue State	2 police officers and 4 others killed.
85	07/02/18	Ogbooro community in Oyo State	SARS commander in Oyo Shen Magu killed.
86	12/02/18	Bakin Kogi State of Jemaa L.G.A. of Kaduna State	4 people killed and one wounded.
87	12/02/18	Guma L.G.A. of Benue State	4 NSCDC officers were killed.
88	12/02/18	Logo L.G.A. of Benue State	Fulani Herdsmen 1 police officer killed.
89	12/02/18	UNILORIN, Kwara State	Multi-Million naira Research and Training farms destroyed.
90	12/02/18	Itigidi, Yakurr L.G.A. of Cross River State.	All Progressive Congress (APC) councillorship Aspirant was shot dead.
91	13/02/18	Akure South L.G.A, Ondo State	L.G.A. workers sacked.
92	13/02/18	Okere Iseyin in Iseyin L.G.A. of Oyo State	12 herdsmen killed while 14 were declared missing.
93	27/02/18	Numan-Demsa area of Adamawa State	Herdsmen PDP spokesmen Sam Zadock killed and 23 others were shot dead.
94	04/03/2018	Leme in Saduana LGA of Taraba State	20 people killed, 12 injured while 300 cattle were rustled
95	05/03/2018	Omosu village in Ojigo ward, Edumoga of Okpokwu LGA of Benue State	10 persons feared dead, several houses burnt down and property destroyed.

96	06/03/2018	Okpokwu LGA of Benue State	24 persons killed, villages deserted and property destroyed
97	06/11/2018	Tiv community, Mkgovur village in Buruku LGA, Benue State	7 people were killed
98	14/03/2018	Umuobasikwu, Ozuitem community in Bende LGA, Abia State	1 person was killed and several others injured
99	27/03/2018	Adam Village, Kwande LGA, Benue State	1 killed, 1 injured, women raped in their farms.
100	28/03/2018	Emuhu community in Ika South LGA, Delta State	3 persons were killed while six others sustained injuries.
101	01/04/2018	Obio Usiere in Eniong Abatim, Odukpani LGA, Cross River State	killed no fewer than 10 persons
102	08/05/2018	Tse-Akaa village, Ugondo Mbamar District of Logo LGA, Benue State	3 persons were killed
103	12/05/2018	Ossissa community in Ndokwa East LGA, Delta State	Suspected herdsmen beheaded a commercial motorcycle rider and six farmers
104	18/05/2018	Afam Uku, Oyigbo LGA, Rivers State	2 persons lost their lives
105	22/05/2018	Ewu community, Esan Central LGA, Edo State	2 people were killed and 1 was wounded. Crops were destroyed and lots of persons sacked from their farmlands

Source: Nkwede, Nwankwo, Aro and Dauda (2018); Oli, Ibekwe and Nwankwo (2018); Abdulbarkindo and Alupsen (2017).

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Steps to Success Exercise Program in Weight Management for Psychiatric Patients Taking Atypical Antipsychotic Drugs

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ABSTRACT

Background: Patients taking atypical antipsychotics are in danger of antipsychotic-induced weight gain. Weight increases rapidly in the initial period after starting antipsychotics. Cardiovascular and cerebrovascular morbidity and mortality and reduced quality of. Both nonpharmacologic prevention and intervention strategies have shown modest effects on weight. Changes in physical appearance can lead to body image issues and problems with self-esteem, which in turn could lead to poor compliance with medication.

Purpose: This study is aimed evaluate the effectiveness of an exercise program that can benefit patients who are gaining weight related to atypical antipsychotic agent intake.

Methods: A quasi-experimental research design was undertaken. The research setting was held in a general tertiary medical teaching/training medical facility owned by the Philippine government. There are 31 respondents for this study 12 were males and 19 were females who were chosen from the list of the in-patients utilizing the universal sampling technique. Data were gathered using a self-formulated tool to collect mostly demographic data which is adopted from the National Alliance for Mental Health.

Results: Patients' diagnosis tends to have a positive relationship with weight loss. Respondents diagnosed with bipolar with psychotic features showed to have loss weight more than the diagnosed with schizophrenia. The results of this study showed that patient's adhering to the exercise program had lost weight after the course.

Conclusion: Activity and exercise are especially important for people living with mental illness. Furthermore, physical activity does not only help patients manage their weight but to serve as diversional activity that adds vitality for patients in the facility.

Keywords: Atypical Antipsychotic Drugs, induced weight gain, Exercise Program, Schizophrenia, Bipolar

BACKGROUND

The introduction of a new group of antipsychotic drugs, called atypical because of the properties differing them from classical neuroleptics, gave hope for the beginning of a new era in treatment of psychoses, including schizophrenia. Patients with psychiatric disorders such as bipolar disorder, depression and schizophrenia often take medication for prolonged periods. However, many of the psychotropic drugs in use today cause significant weight gain (Malhi et al., 2001).

Second-generation antipsychotics (SGAs), in comparison with first-generation antipsychotics, are associated with a greater risk for antipsychotic-induced weight gain although this oversimplification should

be clarified by distinguishing across different antipsychotic drugs. Among SGAs, olanzapine appears to cause the most significant weight gain, while ziprasidone seems to cause the least. (Martínez-Ortega et al., 2013)

Nursing profession has played a vital role in the health promotion, disease prevention and wellness. Thus, the researcher conducted this study to the induced weight gain effects of atypical antipsychotics medications. Weight gain as defined is bodybuilding that increases muscle mass and body weight. Moreover, it is established that weight gain is a frequent side effect of antipsychotic medication which has serious implications for patient's health and wellbeing. Weight gain is important both from the clinical subjective point of view as associated with serious somatic consequences and as a source of enormous mental distress (Faulkner et al., 2007).

Atypical antipsychotics (AT) and stress are related to weight gain in individuals with severe mental illness (Hampton et al., 2018). People with serious mental illnesses (SMI) such as schizophrenia, bipolar disorder and major depressive disorder, have poorer physical health and significantly reduced life expectancy compared with the general population (Every-Palmer et al., 2018).

Further, Patients who are taking atypical antipsychotics are in danger of antipsychotic-induced weight gain. Weight increases rapidly in the initial period after starting antipsychotics (Dayabandara et al., 2017a). Further, cardiovascular and cerebrovascular morbidity and mortality and reduced quality of. Both nonpharmacologic prevention and intervention strategies have shown modest effects on weight. Furthermore, changes in physical appearance can lead to body image issues and problems with self-esteem, which in turn could lead to poor compliance with medication (Eapen & John, 2011).

Currently there are no established intervention program for patients whatever their diagnosis, who are taking atypical antipsychotic medication against induced weight gain in the research facility and thus the purpose of this study was to establish an exercise program that can benefit patients not only in the research locale but also to other patient who are experiencing the atypical antipsychotic induced weight gain.

OBJECTIVE

This study is aimed to evaluate the effectiveness of an exercise program that can benefit patients who are gaining weight related to atypical antipsychotic agent intake.

METHODS

Study Design

This study was designed to use quasi-experimental design; however, it lacks randomization because it used the universal sampling method that served as the baseline data after respondent underwent the intervention program. This scheme permits the researcher to examine the change in respondents' weight. This study utilized an exercise program entitled "Steps for Success" adapted from the National Alliance for Mental Health. Respondents were purposively selected from the group of patients admitted in the psychiatric facility. Thirty in-patients were selected according to a set of criteria where the researcher deemed to be significant for the purpose of the study. Participants of the program underwent a 30-minute exercise program, comprising of a 10-minute routine activity, 10-minute exercises and 10-minute cool down activities. This exercise program was instituted for a total of four weeks or 28 days. According to the study entitled Second Generation Antipsychotic Use in Schizophrenia and Associated Weight Gain: A Critical Review and Meta-Analysis of Behavioral and Pharmacologic Treatments, a small group of 16 participants of which eight had schizophrenia, have found out that weight loss can start as early as four weeks (Das et al., 2012).

The degree of participation of the participants varies as to their attention span. Here, patients with mental health disorder such as those diagnosed with bipolar disorder has impaired attention span (Camelo et al., 2013). This may delimit the goals of the program, but it is manageable.

In addition, at the end of four weeks intervention, effectiveness was evaluated according to the set of parameters to judge the program to be effective. Moreover, it is also considered that participation of the

respondents is also perceived to constrain in effect to their diagnoses, thus necessity to include it as one of the variables of the study.

Furthermore, this study does not aim to cure any health conditions that the respondents have during the course of the study but to determine the effectiveness of health promotion towards healthy body weight maintenance among patients taking antipsychotic agents.

Ethical Procedures

Ethical issues were considered in undertaking this study in which all article used were properly cited. Ethical review board of the author's university affiliation approved the study. Further, approval from the concerned individuals was secured before data collection. The gathered data were handled with utmost respect and confidentiality. As such, the researcher intensifies consent letters to the institution where the study was conducted. The participants were made to understand the purposes of the research, the expected duration, their right to decline to participate and to withdraw from the research; the foreseeable consequences of declining or withdrawing and the potential risk. Limitations of confidentiality were also explained, the incentive for participation, and whom to contact with regard to questions about the research and their rights. Confidentiality was strictly observed in the whole process of research. More so, voluntary participation was ensured.

Participants and Sampling Scheme

A total of thirty-one (31) respondents were chosen to participant in this study of which twelve are male and nineteen were females. This study utilized the universal sampling technique since [explain why universal sampling was used]. The patient's present weight was measured, and their individual medication regimen was reviewed. After measurement and review, respondents and participants for this study were selected based on the criteria. The criteria for selection was a) taking atypical antipsychotic medication b) with weight gain more than 10 percent of the baseline weight and c) must be an in-patient of the psychiatric facility. The exclusions include, out-patient, those weight gain which is not more than ten (10%) percent of the baseline weight and those who are physically unable to do the activities of daily living.

Research Instrument

The basic tool that the researcher used in order to obtain information from the respondents was the researcher made questionnaire adapted from the exercise program entitled "Steps to Success" from the National Alliance for Mental Health. A questionnaire deals with the respondent's demographic profile in terms of gender, age, medication taken, anthropometric This was the exercise program that was implemented to the respondents. This program is designed by the Center for Disease Control and Prevention to be administered to mentally challenged individuals. This tool includes recommended types of exercise that can suit best the above-mentioned patients.

A questionnaire deals with the patient's demographic profile in terms of gender, age, medication taken, anthropometric measurements and the patient's diagnosis was made available as well. It contains the history of the patient; this includes how long the patient had been in atypical antipsychotic therapy, weight history as well as the nutritional assessment of the patient.

To measure the weight differences, weight before the treatment was obtained first as to contrast it to the weight post treatment and this was recorded in the questionnaire.

A weighing scale in the facility was used in obtaining the daily weight of the patients. Patient's weights are measured before and after the program using the same weighing scale, using the same clothing and the same time daily.

Moreover, the research instrument contains all necessary and relevant information that involves weight management of these patients. The self-made questionnaire first part is the demographic data, which describes the patient's profile, the preliminaries which includes the baseline weight, the activities of daily living and the kind of diet the patient is taking. Part two of the questionnaire describes the degree of patient's participation in the intervention program, recent changes in the diet and the comments for the intervention program. The Step Up to Success Program is already described in the above statements and

lastly, the weight monitoring chart serves as a tool to track the changes in the patient's weight throughout the intervention program.

Statistical Treatment of Data

The following tools were used for the analysis of the data gathered:

To determine the profile of the respondents in terms of age and gender, the descriptive statistics was used using the mean, median, mode and standard deviation. For the brand of atypical antipsychotic and patient's diagnosis, the frequency and percentage were used.

To find out the significant reduction of weights among patients after the intervention, the paired t-test was used before and after the intervention.

To know if significant relationship between age, gender, and brand of atypical antipsychotic agent used, patient's diagnosis and weight loss exist, the multiple linear regression was used.

All data was set at 0.06 level of significance for the rejection and acceptance of null hypothesis using the Minitab software version 15.

RESULTS

This study mostly composed of female respondents compared to males. This is due to the fact that at the time of the study there was more female admitted patients compared to males. Bipolar disorder is more common in women than in men, 1 in 4 women will require treatment for depression at some time, compared to 1 in 10 men. The reasons for this are unclear but are thought to be due to both social and biological factors. It has also been suggested that depression in men may have been under diagnosed because they present to their General practitioner with different symptoms (National Institute for Clinical Excellence, 2003).

Moreover, researchers found out that when it comes to mental illness sexes differ. Women are more likely to be diagnosed with anxiety and depression, while men tend toward substance abuse or antisocial disorders (Vaillant, 2003).

Furthermore, it is also supported the idea above that women are more likely to have been treated for a mental health problem than men (29% compared to 17%) (Gunnell & Harbord, 2003). This could be because, when asked, women are more likely to report symptoms of common mental health problems.

Moreover, the result revealed that there are more patients prescribed with risperidone compared to other antipsychotic brands. This increase in risperidone use is due to the fact that only one doctor manages most of the respondents, hence it showed that this is the drug preferred by the doctor. Moreover, risperidone as a second-generation antipsychotic drug is less sedating compared to other atypical antipsychotics thus allow the patient to continue with usual activities without fear of encountering accidents related to sedation. Furthermore, Risperidone is one of a number of 'atypical antipsychotics' which are currently being marketed for the treatment of those with schizophrenia, largely on the basis of claims of improved tolerability and effectiveness compared to much cheaper conventional antipsychotics (Gilbody et al., 2016). However, in this same study, the authors also noted that risperidone possess less favorable effects such as it is less acceptable to clients because of its higher occurrence of extrapyramidal side effects, and slight improvement of mental states. Thus, despite the notable unfavorable effects, it is not surprising that this medication will be favored more in the treatment of mental illness.

Risperidone's relative lack of extrapyramidal syndromes at effective doses indicates that risperidone has a substantially better efficacy/side-effect ratio when compared with conventional compounds. Patients who are unable to tolerate other antipsychotic at doses that are needed to control psychotic symptoms are likely to respond better to risperidone. It may also be more effective agent for patients with negative symptoms and in certain groups unresponsive to trials of typical agents. Thus, with these benefits that patient can get from risperidone, no doubt that psychiatrist prescribes such medication.

The study showed that most of the respondents are diagnosed with bipolar disorder with psychotic features followed by clients with schizophrenia. Patients with bipolar disorders are usually admitted in the hospitals because when these patients experience relapse other conditions, they become dangerous to both themselves

and to those individuals around them. Furthermore, patients at the height of their manic episode will be difficult to handle by their caregivers, thus, most caregivers would opt for their patients to be admitted in the hospital than being cared at home.

The issue of violence is particularly perplexing in connection with the role of psychiatric disorders as contributing factors. Several psychiatric conditions, including bipolar disorder, have been implicated with increased rates of violent behavior (Feldmann, 2001). Bipolar patients are prone to agitation that may result in impulsive aggression during manic and mixed episodes. However, the breast spades, which can involve intense dysphoria with agitation and irritability, may also carry a risk of violent behavior. Even during euthymia, bipolar patients -especially those with comorbid features of borderline personality disorder -may have chronic impulsivity that predisposes them to aggression and thus would post a need to be admitted to be managed and for safety to be instituted not just for the patient itself but for people around them as well. Moreover, a study entitled “predictors of Trait aggression in bipolar disorder” it was mentioned that aside from treating the manic episode, other measures may be used if needed to quickly control aggressive behavior. These include sedating medication, seclusion, and restraint. it is important to provide an environment that minimizes overstimulation and includes clear interpersonal communication and limit setting (Garno et al., 2008). This can all be done in managed when a patient is confined in a mental health facility. Thus, more families opted to have their loved ones admitted.

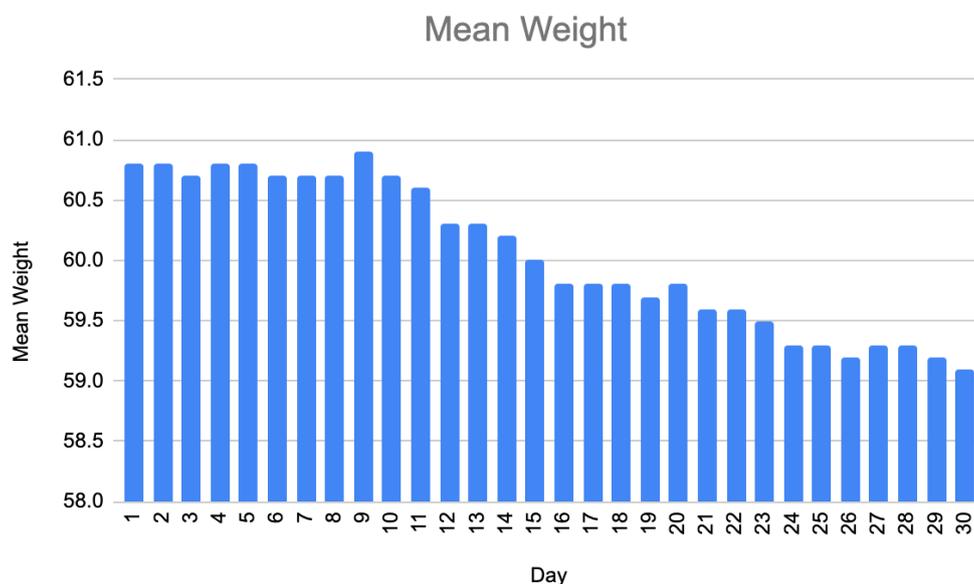


Figure 1. Mean weight of the respondents in 30 days of Exercise

Figure 1 shows the mean weights of the respondents during the 30- day intervention period can be gleaned from the figure that maximum weight gain of the respondents was attained during the 9th day of the implementation period. This can be viewed as a challenge to the study which can be attributed to low expectations of weight loss attempts, reduced support from family and friends, adoption of unhealthy lifestyles, use of food as a coping strategy and attrition from weight loss programs (National Obesity Observatory, 2011). This increase is also due to the fact that clients’ daily routine is, once the food is served, they will have to get in line for medication then they can go sleeping the rest of the day. The first day of the program the participants are still adjusting to their activities being introduced. However, the challenge to the study did not persist for along upon the establishment of the regular implementation of the exercise program. Day by day the respondents anticipate that they will be having the exercise program and weighing activities. In the second week of exercise program, they were nursing students who were assigned to the facility and they too conducted their own programs which include exercise programs but not in a regular basis. The researcher noticed that those respondents who were regularly participating in the program showed their mean weights gradually reduced with the highest weight loss attained on the 26th day of the implementation.

In the study conducted by the team from John Hopkins University hospital, the author quoted that “we sought to dispel the perception that lifestyle programs don't work in this population”. we brought a weight-loss program to them, tailored to the needs some people with serious mental illness (Wood, 2013). Moreover, the author concluded that their study was indeed helpful and effective in managing the weight of those mentally ill patients.

	N	Mean	StDev	SE Mean	P Value
Baseline	31	60.87	6.30	1.13	
Weight After	31	59.23	6.49	1.17	0.00
Difference	31	1.645	1.199	0.215	

95% CI for mean difference: (1.206, 2.085)

T-Test of Mean difference= 0 (vs not 0): T-Value= 7.64

Table 1. Paired T-Test and CI: Baseline, Weight After

Figure 2 showed that there is a significant reduction of the respondent’s weight after the intervention program had been implemented. In a study entitled Management of Antipsychotic-induced weight gain: Prospective Naturalistic Study of the Effectiveness of a Supervised Exercise Program, it has been conclusively ended that body weight and metabolic risk profile in patients receiving a typical antipsychotic medications can be effectively managed with a weight control program including physical activity (Poulin et al., 2007). Thus, in institutionalized mentally ill manage with second-generation antipsychotics a regular exercise program is needed to manage drug-induced weight gain.

In a study, it was found out that lifestyle interventions appear effective for treating overweight and obesity among people with serious mental illness. These included behavioral interventions and interventions targeting self-monitoring, dietary changes, nutrition education, fitness, exercise or physical activity (Naslund et al., 2017).

Moreover, it was concluded that the weight gain liabilities of antipsychotic drugs are partly associated with their ability to increase appetite. The long-term treatment with atypical antipsychotics is the same time increasing their appetite and weight (Werneke et al., 2013).

Nonpharmacologic interventions are important in the management of AIWG. Dietary counseling, exercise interventions, cognitive and behavioral strategies appear to be equally effective as individual and group therapies. All patients who are commenced on antipsychotics should be routinely provided with nutritional counseling and advice about a healthy lifestyle. Those who gain weight should be enrolled in structured program which monitors the adherence of patients to the management plan. Nonpharmacologic interventions appear to be more effective in patients treated with antipsychotics with a high propensity for weight gain (Dayabandara et al., 2017b).

Gender	f	%
Male	12	38.71
Female	19	61.29
Total	31	100

Table 2. Profile of the Respondents in Terms of Gender

Variables	P Value
Weight	0.315
Gender	

Table 3. Weight Loss versus Gender

Moreover, the computed probability value of 0.315 is greater than 0.05. This means that gender has nothing to do with weight loss. In one study, the analysis indicated that although men and women reported different motivation for and approaches to weight loss prior to their enrollment in the study, weight-related behaviors at study entry were similar, including meal patterns and leisure time physical activity. Further, in another study entitled “Acute weight gain, gender, and therapeutic response to antipsychotics in the treatment of patients with schizophrenia” the results concluded and indicated that gender was not a significant variable.

Brand of Antipsychotic	f	%
Resperidone	22	70.97
Olanzapine	5	16.13
Quetiapine	2	06.45
Aripiprazole	2	06.45
Total	31	100

Table 4. Profile of the Respondents in Terms of Brand of Antipsychotic Medication used

Variables	P Value
Weight	0.301
Brand	

Table 5. Weight Loss versus Brand

In considering the brand of atypical antipsychotic, in a study entitled “Serious Mental Illness No Barrier To Weight Loss Success” it was concluded that, no matter if the patient is taking medications which are known to cause weight gain such as a typical antipsychotic medications and mood stabilizers for clients who are bipolar it showed that where the institution of this exercise program the respondents lose weight (Daumit et al., 2013). In addition, another study concluded that patients were able to lose weight no matter what a typical antipsychotic they were receiving (olanzapine, Clozapine, risperidone or quetiapine) with no significant differences between the drugs. The study was designed to detect differences between drugs (Vreeland et al., 2003).

Patient’s Diagnosis	f	%
Schizophrenia with Auditory Hallucination	2	06.45
Disorganized Schizophrenia	8	25.81
Schizophrenia	9	29.03
Bipolar with Psychotic Features	12	38.71
Total	31	100

Table 6. Profile of the Respondents in Terms of Patient’s Diagnosis

Variables	P Value
Weight	0.023
Gender	

Table 7. Weight Loss versus Diagnosis

Further, the study found out through a computed probability value of 0.023 that is lesser than 0.05 that the diagnosis of the client has something to do with weight loss.

In a study entitled “Exercise and Mood-Exploring the Role Of Exercise And Regulating Stress Reactivity In Bipolar Patients” it has been found out that depressive episodes and bipolar depressions are associated with a higher degree of agitation, hypersomnia, and more cycle model reputation thus leading to weight loss. Further, patients diagnosed with bipolar tends to lose weight more compared to schizophrenia patients (Edenfield, 2008). This is supported by the fact that Bipolar patients’ characteristics such as being restless, sleeping little, behaving impossibly and taking part in a lot of pleasurable, high risk behaviors, such as spending sprees, impulsive sex, and impulsive business investments.

A review of empirically validated weight interventions for individuals with schizophrenia found that these programs emphasized nutrition, exercise, and behavioral change to stabilize or reduce weight. Subsequent reviews and results of meta-analyses support the efficacy of behavioral or psychoeducation-based interventions to stabilize weight and promote modest weight loss among individuals with schizophrenia. Components of these psychosocial interventions have included: 1) psychoeducation regarding diet and exercise, 2) goal setting, 3) self-monitoring of food and physical activity level, 4) caloric restriction, and 5) increase in physical activity. Clinical trials have found support for modest weight loss among individuals with severe mental illness who received the psychosocial intervention relative to those in the control condition (Niv et al., 2014). Participating in your chosen activities for at least 20 minutes per day, around four times per week, working up to 45 minutes per session can do a lot more, said the organization.

Additionally, participants with mental illnesses such as schizophrenia, bipolar disorder or major depression no barrier to weight loss. In a behavioral program such as exercise, it has been found that participants lost more weight as the intervention went on. These findings say that it took a while to see some changes but once this modification is adapted by the respondents, positive results is achievable (Daumit et al., 2013).

Furthermore, symptoms of depression and bipolar disorder are similar to those of other forms of depression. Individuals experience empty, sad, or irritable mood throughout most of the day and although in bipolar depression increased appetite and weight gain are commonly experienced weight loss especially if they undergo into behavioral therapies such as exercise.

DISCUSSION

The results analysis indicates that an active lifestyle is important for everyone. This is particularly true for those living with schizophrenia and other serious mental illnesses (e.g. bipolar disorder) who are treated with second-generation, a typical antipsychotic medication (SGA’s) because they are more vulnerable to obesity. Activity and exercise are especially important for people living with mental illness. It is a fact the patients gain weight in the course of treatment with atypical antipsychotic and thus this needs to be addressed. Furthermore, physical activity does not only help patients manage their weight but to serve as diversional activity that adds vitality for patients in the facility.

Moreover, the facility doesn't have a structured exercise program and that it is only when there are student nurses who are on duty to the facility that these patients get to have exercise programs. The researcher recommended the creation of a therapeutic group that is focused and regular implementation of an exercise program this led by an assigned patient -leader -facilitator, we're in each patient who are ready to go and mentally stable are alternately assigned to lead a therapeutic group.

Hence, the researcher recommends the facility may adopt the “steps to success program “adapted from the National Alliance for Mental Illness. This will help the patients utilize their idle time while confined in the facility

CONCLUSION

Activity and exercise are especially important for people living with mental illness. Furthermore, physical activity does not only help patients manage their weight but to serve as diversional activity that adds vitality for patients in the facility.

CONFLICTS OF INTEREST

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COVID19: Inflammatory biomarkers, predictors of severity?

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Abstract

In December 2019, a viral pneumonia caused by the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2), begins in Wuhan (China) and quickly spread around the world. Today more than 3.5 million people are infected. Even though the mortality rate is relatively low, a considerable number of patients die every day. It appears that the cytokine storm is one of the main causes of death in coronavirus disease 2019 (COVID-19), and that targeting the inflammation process would save the most severe patients. Our experience at the hospital has shown us that it is still difficult to recover patients at an advanced stage of the disease. Since biology is more sensitive than imaging in predicting disease severity, monitoring of inflammatory biomarkers such as serum ferritin, D-dimer and lactate dehydrogenase (LDH), has great value in the early detection of patients at risk of developing acute respiratory distress syndrome (ARDS) or multisystemic failure. These findings may be useful with the imminent risk of a second outbreak for a correct management of patients with COVID19.

Introduction

Coronaviruses are enveloped, single positive stranded RNA viruses, which belong to the subfamily Coronavirinae. While the majority of these viruses are responsible for mild infections, there have been two past epidemics caused by betacoronaviruses. The Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV), resulted in more than 10,000 cases in the past two decades, with a mortality rate of 10% for SARS-CoV and 37% for MERS-CoV.

At the end of December 2019, numerous cases of viral pneumonia were recorded in Wuhan, a city in the Hubei province of China, and were associated with a seafood market that also sold non-aquatic animals. On 7 January, a new coronavirus was identified, and named COVID-2019 by the WHO.

Morocco, like the rest of the world, is facing this new infection caused by the coronavirus. The country experienced its first case in early March 2020, and quickly many sanitary measures were put in place by the authorities, such as containment and early detection of suspicious cases. It is in this context that the structure and staff of the Cheikh Khalifa University Hospital (HCK) were reorganized to cope with a large influx of patients.

The Internal Medicine team has been involved in the management of this health crisis, as it is a multifaceted pathology. While its tropism is primarily pulmonary, in some patients, other organs may also be affected, as a consequence of a systemic inflammatory reaction. It appears that the cytokine storm is one of the main causes of death in coronavirus disease 2019 (COVID-19), and that targeting the inflammation process would save the most severe patients.

Here we present an analysis of the temporal changes of inflammatory biomarkers during hospitalization in patients with COVID19, to highlight their interest in predicting the severity of the disease and in guiding therapeutic management.

Materials and methods

Study design and participants

This retrospective study was carried out in the internal department of the Cheikh Khalifa University Hospital in Casablanca from March 23th, 2020 to April 27th.

All patients diagnosed as having COVID-19 according to WHO interim guidance, hospitalized at the HCK, dead or discharged; were enrolled in this study.

Patients hospitalized in COVID units with a positive chest computed tomography (CT) scan and a biological inflammatory syndrome but a negative real-time reverse-transcriptase-polymerase chain reaction (rRT-PCR), have been excluded.

Data collection

Patients admitted on suspicion of COVID-19 were routinely provided with an rRT-PCR treated by nasopharyngeal swab, a CT scan, and a revised and completed blood examination as per the new data in the literature. Some patients were transferred from other hospitals and benefited from some of these examinations on an outpatient basis.

Routine blood examinations included blood count, C Reactive Protein (CRP), LDH, serum ferritin, D-dimer, kidney and liver function, and myocardial enzymes.

Epidemiological, demographic, clinical, laboratory, treatment, and outcome data were extracted from electronic medical records using a standardized data collection form.

Missing data were retrieved from the physical records recovered from archives.

Statistical analysis

We used the IBM SPSS statistics software for the statistical analysis of our data and to explore the biological risk factors associated with death during hospitalization.

Qualitative variables were expressed in headcount and percentage, and quantitative variables were expressed in mean and standard deviation.

The student T-test was used to compare two means. The significance level was set at $p < 0.05$.

Results

Out of 631 patients tested before April 27, 2020, 146 were confirmed positive and were hospitalized in HCK's COVID units. The median age was 49.16 years, ranging from 5 to 84 years, and males were more frequently affected (59%). Comorbidities existed in 91 of the patients, hypertension being the most common, followed by diabetes. 71.9% of patients had non-severe forms (mild and moderate) versus 28.1% severe (severe and critical). The most common symptoms on admission were cough and fever. The majority of patients received first-line treatment (Plaquenil-Azythromicine combination), unless contraindicated (4 cases). Antivirals (Lopinavir / Ritonavir) were administered to 11 patients, including 6 in the intensive care unit. Tocilizumab (a blocker of IL-6R) was also used in the intensive care unit in 5 patients.

We recorded 14 deaths. These deaths were the consequence of complications such as acute respiratory distress syndrome (ARDS), septic shock, heart failure or multisystemic failure (*Figure 1*).

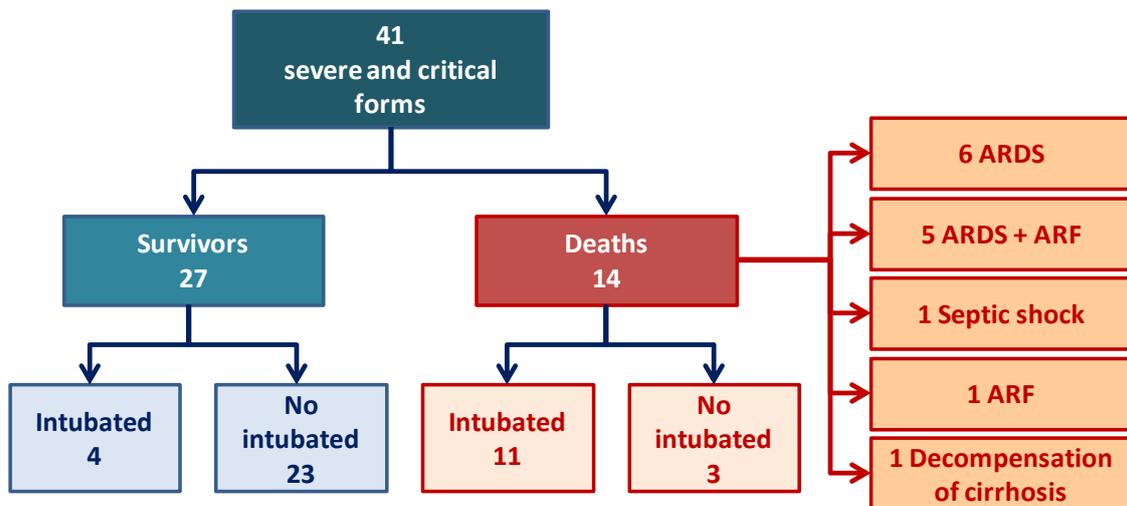


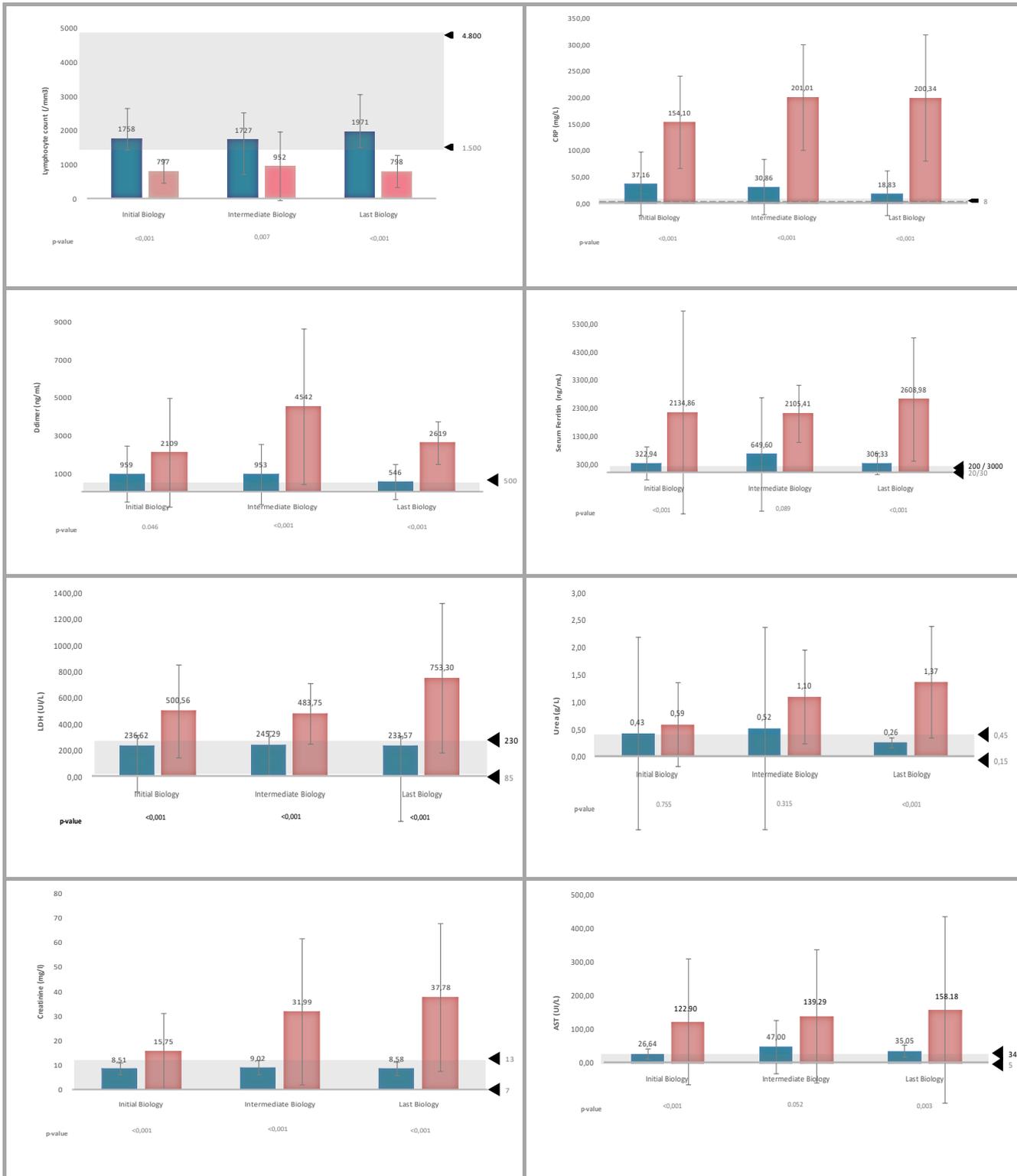
Figure 1: Status of patients in intensive care units, and main complications leading to the 14 deaths

ARDS: acute respiratory distress syndrome

ARF: acute renal failure

It is important to note that patients admitted to the intensive care unit had elevated white blood cell and neutrophil counts, lymphopenia, and increases in CRP, D-dimer, ferritin and LDH. If we look at the group of deceased patients, we see that all these

parameters are disturbed and are accompanied at the last check-ups by the installation of cytolysis, acute renal failure and an increase in troponins, the signature of multisystem failure (*Figure 2*).



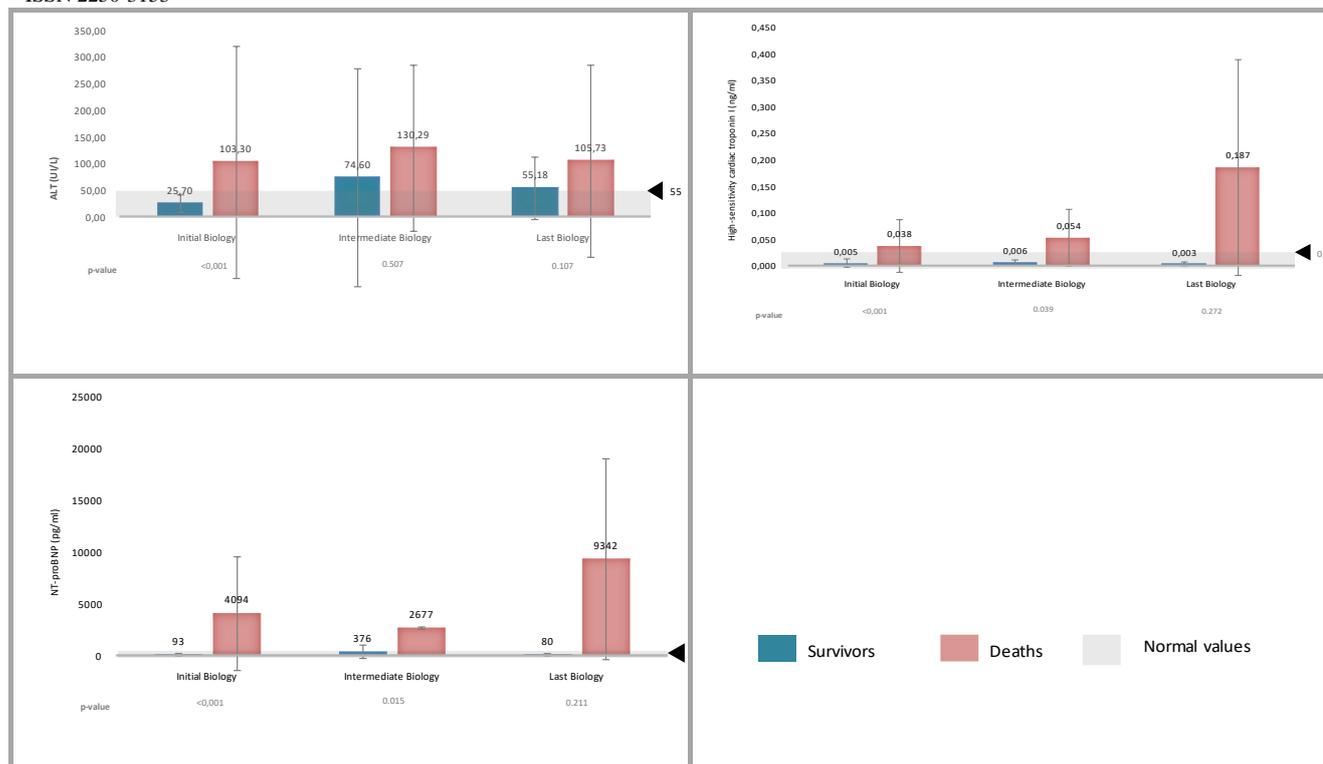


Figure 2: Temporal changes in laboratory markers in COVID-19 patients

The markers were tracked from the first day of the patients' hospitalization. We evaluated their temporal changes, based on three blood examinations: initial, intermediate and last one. Differences between survivors and non-survivors were significant from illness onset.

These biological perturbations highlight the existence of systemic inflammation downstream of the infection, and reflect the transformation of the infectious disease into a potentially fatal systemic inflammatory disease.

Discussion

Our results seem to agree with the literature. Zhou et al [1], in a retrospective cohort study identified several risk factors for death in patients with COVID-19 who were hospitalized in Wuhan, like older age, comorbidities, SOFA score, higher rates of D-dimer (1 µg/ml), but also elevated levels of ferritin, LDH, IL6, cardiac troponins, and lymphopenia. The elevation of the inflammatory biomarkers would indicate the transition from infectious to systemic disease.

There are two overlapping pathological phenomena, the first is triggered by the virus, and the second is an inflammatory response of the host. In all individuals regardless of age or comorbidities, the disease tends to present these two phases, although at different levels of severity.

The better understanding of the pathophysiology of SARS-COV2 [2; 3; 4], has allowed us to consider the use of immunosuppressants in COVID-19 in addition to anti-viral therapy [5; 6]. Indeed, this infection reminds us of certain vasculitis

whose etiopathogeny involves certain viruses such as HCV or HBV, and where it is important to target inflammatory events downstream of the infection.

The problem we faced was to know at which stage of the disease this therapeutic approach should be used. If high-dose corticosteroid therapy has been administered systematically in patients with a persistent elevation of ferritinemia, LDH or D-Dimer, Tocilizumab (anti-IL6) could only be used in 5 patients in intensive care at the intubation-ventilation stage and the results were disappointing as we recorded 4 deaths.

It is therefore essential from a practical point of view to establish a clearer course of action, based on the monitoring of severity factors and essentially the biological ones which reflect the onset of the systemic inflammatory syndrome responsible in certain patients for respiratory distress or even multi-organ failure. The superiority of biology over imaging in the prediction of severity has been noted. If CT seems to be more sensitive than viral DNA search by RT-PCR for COVID-19 diagnosis [7; 8]; there is no clinical-radiological correlation. In fact, subjects with few symptoms may have CT abnormalities similar to those of patients with more severe forms of the disease (*Figure 3*).

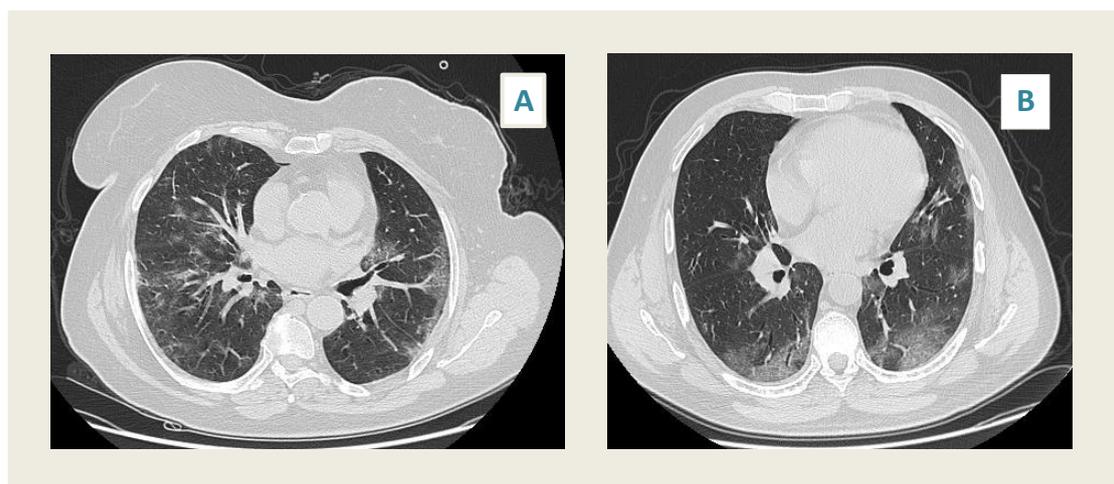


Figure 3: CT scan with CORADS 5 in patients with mild form of COVID-19

Axial CT images without intravenous contrast corresponding to a CORADS 5, of a 57 years old woman (A) and a 55 years old man (B) who presented a mild form of the disease.

The scan showed bilateral peripheral areas of GGO (Ground glass opacities).
It is very high level of suspicion for pulmonary involvement by COVID-19.

The clinical-therapeutic classification proposed by Siddiqi et Mehra [9], seems to be the most appropriate in practice. This classification distinguishes three degrees of severity in patients with COVID19, corresponding to distinct clinical and biological conditions, each involving specific therapeutic management.

The first stage occurs at the time of inoculation of the virus responsible for the onset of the disease. SARS-COV-2 binds to the angiotensin converting enzyme 2 (ACE2) receptor located predominantly in the alveoli (pneumocytes 2) and multiplies in the

lungs during the incubation period [10]. Patients, who limit the infection to this stage, have mild clinical symptoms and make a remarkable recovery. Antiviral treatment at this stage allows accelerated control of viremia.

This is followed by the stage where lung disease is established as a result of the multiplication of the virus and the localized inflammation it causes. Clinically, this translates into a viral pneumonia with cough, fever and in some cases dyspnea. It is generally at this stage that the radiological abnormalities can be assessed, particularly in the thoracic CT scan. Markers of inflammation may be increased, but usually only moderately. If patients develop hypoxia or a significant increase in the inflammatory syndrome, anti-inflammatory therapy may be used to slow the progression of patients to mechanical ventilation.

Only a minority of patients experience the 3rd stage, which is characterized by the development of cytokine release syndrome (CRS), which is a hyper-inflammatory syndrome characterized by fulminant and potentially fatal hypercytokineemia [11]. If the dosage of interleukins like IL6 who plays an important role in CRS could not be performed, we observed an accentuation of lymphopenia, which reflects a massive recruitment of T lymphocytes; or a significant increase in inflammatory biomarkers such as CRP, LDH, Ferritin and Ddimers. In addition to alveolar cells, ACE2, the receptor for SARS-COV-2 is expressed on vascular endothelial cells which would explain the involvement of other organs, as in systemic vasculitis. Anti-inflammatory therapy is then required to reduce systemic inflammation before it leads to multisystemic failure. High-dose corticosteroid therapy and Tocilizumab (anti-IL6) are then recommended [12]. The increase in D-dimers reflects an alteration in blood coagulability. Indeed, patients end up presenting numerous microthrombi disseminated in the organism probably responsible for the multivisceral failure. As for the ARDS, it is probably the consequence of a pulmonary intravascular coagulopathy (PIC). It would seem that in the context of this systemic hyperinflammation, patients would develop antiphospholipid Antibodies [13]. If an anticoagulant prophylaxis is systematically administered to all patients as soon as they are hospitalized, it is essential to associate in this minority of patients a Low-molecular-weight heparin (LMWH) at a curative dose.

Our experience has shown us that despite the use of this therapeutic arsenal, the prognosis remains very engaged and patient recovery is complicated. However, it suggests that the deployment of these therapies should be earlier, hence the interest in monitoring inflammatory biomarkers to help us detect candidate patients in time [14], avoid their hospitalization in intensive care units where the mortality rate is high [15].

The major limitation of this study was that not all laboratory tests were done in all patients, given that the guidelines were not initially clearly defined.

Conclusion

Inflammatory biomarkers could therefore be reliable predictive factors for the detection of potentially serious patients, in order to adapt their therapeutic management and improve their prognosis.

Targeted drug therapy against the virus is most promising when applied early in the course of the disease, but its usefulness at an advanced stage is questionable. The use of anti-inflammatory therapy too early may not be necessary and may even promote viral replication, but it is essential in the systemic inflammatory stage to slow the onset of ARDS and multisystemic failure.

Declarations

This research did not receive any funding.

This study was approved by the Ethics committee of Cheikh Khalifa Hospital.

We declare no conflict of interest.

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Assessment of Health Related Quality of Life Among Tuberculosis Patients at Government Teaching Hospital

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Abstract- At present the Tuberculosis (TB) Management had much attention on microbiological cure, and its impact on HRQOL is undervalued. The study was aimed to assess HRQOL including psychological, general health perception among TB patients. A prospective interventional study was conducted among 52 patients visiting department of chest and TB (IPD & OPD), Gulbarga Institute of Medical Science's, Kalaburagi, for a period of 6 months. The data was collected by face-to-face interview and a suitably designed questionnaire world health organization quality of life (WHOQOL - BREF) and SF-36 questionnaire were used to assess the HRQOL of TB patients at base line before intervention and 2 months after the intervention using a pre-test design. The data of 52 patients were analyzed in the study. Present study reveals that the Mean SD scores of WHOQOL(BREF) of psychological health at base line was 44.35 ± 13.20 , at follow up was 56.60 ± 14.95 and environmental at base line was 51.17 ± 10.60 , at follow up was 60.00 ± 8.09 and p-value < 0.001 , which is very highly significant. The Mean SD score of SF 36 of physical health at base line was 33.87 ± 21.16 , at follow up was 53.0 ± 21.10 and role limitations due to emotional problems at base line was 49.22 ± 38.61 , at follow up was 81.27 ± 27.36 and p-value < 0.001 , which is very highly significant. All the health domains scores are increased after follow up this is due to patient education regarding disease. Patient counselling is one of the most important aspects in developing patient's knowledge about disease, management, precautions and improving overall quality of life. Our study concluded that although HRQOL improved with treatment, the scores on component summary measures showed compromised physical health among the study patients even at the end of the follow up.

Index Terms- Tuberculosis, Health related quality of life, WHOQOL (BREF), SF 36 questionnaire.

I. INTRODUCTION

In 1993 an increase in reported cases of TB in countries across all continents let the WHO to declare TB a global emergency. Tuberculosis (TB) remains a leading infectious killer globally. TB is caused by Mycobacterium tuberculosis, which can produce either a silent, latent infection or a progressive, active disease. Tuberculosis (TB) is a bacterial infection, treatable by anti-TB drugs. It is a global problem, with the incidence varying across the world.^{1,2}

WHO states that TB has been considered as a global threat. It is estimated that approximately 1.9 billions of people or one third of the world population is infected by this disease. Every

year, there are about 9 millions new sufferers of TB with about 3 millions mortality. In developing countries, mortality occurs in around 25% of all cases.⁷

According to global TB report 2018 of all the world population nearly 6.8 million population got effected with Tuberculosis. The effected population may be suffering with Pulmonary TB, Extra Pulmonary TB. In this report - of 133million Indian population nearly 3.7million population got infected with Tuberculosis, of which nearly 85% population are suffering from Pulmonary Tuberculosis. And according to 2017 reports India shares a total of 84% incidence rate.⁸

WHO's definition of health as —a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. In 1993, the world health organization (WHO) initiated a program to reduce TB morbidity and mortality and developed a strategy called directly observed treatment, short course (DOTS). The aims were to detect and treat patients with all forms of TB to reduce transmission of the disease control its spread and increase cure rates.^{11,12} At present, much of the attention within tuberculosis management is spent on microbiological cure, and its important on health related quality of life (HRQOL) is undervalued. Existing literature shows that TB has substantial and encompassing impact on HRQOL of infected patients. In tuberculosis (TB) patients, health-related quality of life (HRQoL) is significant in self-management, which in turn can be effective in therapeutic acceptance and prevention of treatment failure due to multi-drug resistant TB. With effective treatment strategies, the focus of tuberculosis (TB) management has shifted from the prevention of mortality to the avoidance of morbidity. As such, there should be an increased focus on quality of life (QoL).^{13,14,15}

Quality of life in TB (QOL) is a broad, complex, multidimensional concept that incorporates psychological, economic, socio-cultural and spiritual dimensions. Assessment on life quality was covering 5 aspects namely: activity level, daily life, health, social support and expectation.^{16,7}

Physical and mental distress is found to be common in TB patients and as a result leading to poor disease outcome or poor treatment outcome. Physical functioning reflects the capacity of the patient to carry out basic day-to-day activities, impaired physical functioning was closely related to the development of fatigue. Social support is important for chronic disease sufferers because social support can influence individual behavior, such as decrease in anxiety, helpless and desperate feeling that will then increase their health status.^{14,4,7}

TB patients are considered to be a source of infection for the healthy individuals, so they have to face social rejection and isolation. In a few studies, TB patients themselves reported that they experienced negative emotions such as anxiety and fear.

Stigmatization and negative emotions resulting from illness could result in a long term impairment of patients psychosocial well-being. While psychological health takes into account several facets of the individual's mood and emotional well-being.^{17,13}

Psychosocial factors, such as poor levels of education, have been shown to influence whether patients are adherent with their medication. Increased knowledge and awareness about the disease is important along with early detection, diagnosis, and treatment in order to control TB. The untreated patients can become a source of transmission of infection leading to spread of disease whereas irregularities in treatment can lead to drug resistance.

Health related quality of life is the impact that perceived health status has on the normal functions of life. Reduced health related quality of life can lead to depression and medication adherence which can further lead to worsening of the medical condition.^{18,19}

Poor adherence to treatment remains a major obstacle in the global fight against tuberculosis (TB). Poor treatment adherence increase the risk of drug resistance, treatment failure, relapse and death.²⁰

The poor patient adherence in tuberculosis (TB) treatment is considered to be one of the most serious challenges which reflect the decrease of treatment success and emerging of the Multidrug Resistance-TB (MDR-TB). Several previous studies have showed HRQOL varies among TB patients at different stages of treatment and is significantly worse than HRQOL among the general population at all stages of treatment.^{21,11} Resistance to anti tubercular drugs has become a serious obstacle in the control of the disease.²²

II. AIM & OBJECTIVES

1. To assess health related quality of life including psychological, general health perception among tuberculosis patients.
2. To review quality of life (QoL) by using World Health Organization Quality of Life (WHOQoL - BREF) questionnaire and Short Form Health Survey - 36 (SF - 36) questionnaire.
3. To increase the level and extent of health education to the maximum extent.

III. METHODOLOGY

Prospective interventional study conducted at Department of Chest and TB (IPD&OPD), Gulbarga Institute of Medical Sciences, Kalaburagi from October 2018 to march 2019 (06 months). A sample of 52 patients were enrolled in to the study based on inclusion criteria. patients who are on ATT for at least 2-3 months are included in the study and the exclusion criteria

1. Patient who are not turned up for follow up. 2. Patients who are diagnosed with Extra Pulmonary Tuberculosis. 3. HIV patients

Study procedure:

The study was conducted at department Chest and TB. Patients diagnosed with TB were enrolled into the study considering inclusion and exclusion criteria. Informed consent

was taken from each patient at the time of enrollment. Details regarding demography, disease and treatment were collected from the case sheets and lab reports of the patients in a specially designed patient case collection form.

A patient information leaflet (PIL) was prepared on TB by using the standard text books, journals, internet and other sources. The PIL contains the information about the disease and its management, Life style modifications and importance of adherence to the treatment.

On the day of enrollment patients were provided with patient information leaflet (PIL) on TB. Firstly patients will be assessed for the baseline with help of World

Health Organization Quality of Life (WHOQOL- BREF) and Short Form Health Survey-36 (SF-36) questionnaire outcome is noted. Patients asked to turn up for first follow-up after two months and assessed for the same.

The results of the study were analyzed statistically using SPSS version 20.0

IV. RESULTS

A total of 52 patients were enrolled in to the study of which 40 (76.93%) patients were completed the study and remaining 12 (23.07%) patients were excluded from the study.

Table 1: Socio-demographic characteristics of the patients

Characteristics	Patients n(%)
No of patients	40
Sex	
Male	24 (66%)
Female	16 (34%)
Age	
0-20 years	5 (12.5%)
21-40 years	14 (35%)
41-60 years	12 (30%)
>60 years	9 (22.5%)
Area	
Urban	10 (25%)
Rural	30 (75%)
Social Habits	
Smoking	7 (17.5%)
Alcoholic	5 (12.5%)
Tobacco chewing	5 (12.5%)

Gender:

Results revealed that the most affected gender is Male 24(60%) and the Female were 16(40%).

Age:

Results revealed that more number of patients 14 (35%) were in the age group 21-40 years, followed by 12(30%) patients in the age group of 41-60 years, followed by 9(22.5%) patients

with age group of > 60 years and 5(12.5%) patients were in the age group of 0-20 years.

Area:

In our study majority of patients are from Rural area 30 (75%) and 10 (25%) from Urban.

Social habits:

Out of 40 patients 7 (17.5%) patients are habituated to smoking, 5(12.5%) patients are habituate to alcohol, 5 (12.5%) patients are habituated to tobacco chewing and rest 23 (57.5%) patients have no social habits.

Previous history of TB:

Among the 40 enrolled TB patients about 8 (20%) patients are having previous history of TB and the rest 32 (80%) patients are newly diagnosed with TB.

Co-morbidity:

Results revealed that 4(10%) patients had co-morbidities and 36(90%) are without co-morbidities.

Table no: 2 Comparison of mean scores of variables base line and follow up of SF-36

variables	Base line	Follow-up	t- test value	P- value & Significance
	Mean ± SD	Mean ± SD		
Physical function	33.87 ± 21.16	53.0 ± 21.10	t = 3.78	P=0.001, VHS
Role limitations due to physical health	25.63 ± 45.23	48.12 ± 30.30	t = 2.90	P=0.006, HS
Role limitations due to emotional problems	49.22 ± 38.61	81.27 ± 27.36	t = 4.64	P=0.000, VHS
Energy/ fatigue	38.55 ± 9.78	42.37 ± 13.27	t = 1.84	P=0.073, NS
Emotional well being	67.22 ± 15.39	75.40 ± 8.62	t = 2.84	P=0.007, HS
Social functioning	49.0 ± 16.23	53.87 ± 18.36	t = 1.71	P=0.096, NS
Pain	39.0 ± 10.22	46.17 ± 16.71	t = 2.79	P=0.010, HS
General health	48.12 ± 8.56	49.57 ± 9.18	t = 0.88	P=0.383, NS

NS= Not significant, S=Significant, HS=Highly significant, VHS=Very highly significant

Present study reveals that, there was statistically very highly significant difference of mean scores of SF 36 of Physical function, Role limitations due to emotional problems before and after follow up (P<0.001).

There was statistically highly significant difference of mean scores of Role limitations due to physical health, Emotional well being and Pain before and after follow up (P<0.01).

There was no statistical significant difference of mean scores of Energy/ fatigue, Social functioning and General health before and after follow up (P>0.05).

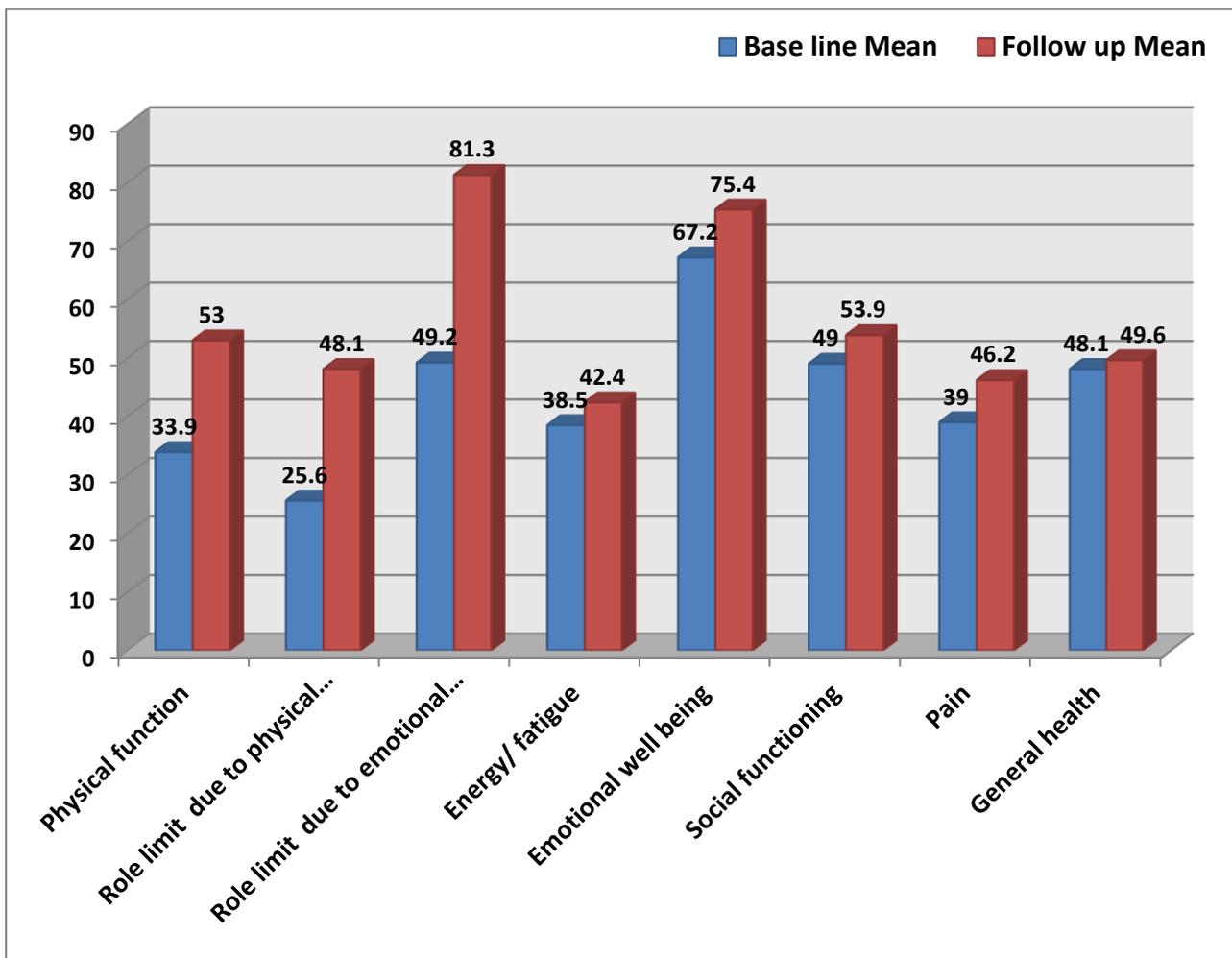


Fig :1 Comparison of mean scores of variables base line and follow up of SF-36

Table no:3 Comparison of mean scores of variables base line and follow up of WHOQOL (BREF)

variables	Base line	Follow-up	t- test value	P- value & Significance
	Mean ± SD	Mean ± SD		
Physical health	39.12 ± 11.61	44.97 ± 20.42	t = 2.17	P=0.036, S
Psychological health	44.35 ± 13.20	56.60 ± 14.95	t = 5.52	P=0.000, VHS
Social relationships	47.53 ± 8.28	50.60 ± 4.61	t = 2.26	P=0.029, S
Environmental	51.17 ± 10.60	60.00 ± 8.09	t = 4.79	P=0.000, VHS

Present study reveals that, there was statistically very highly significant difference of mean scores of WHOQOL (BREF) of Psychological health and Environmental before and after follow up (P<0.001).

There was statistical significant difference of mean scores of Physical health and social relationships before and after follow up (P<0.05).

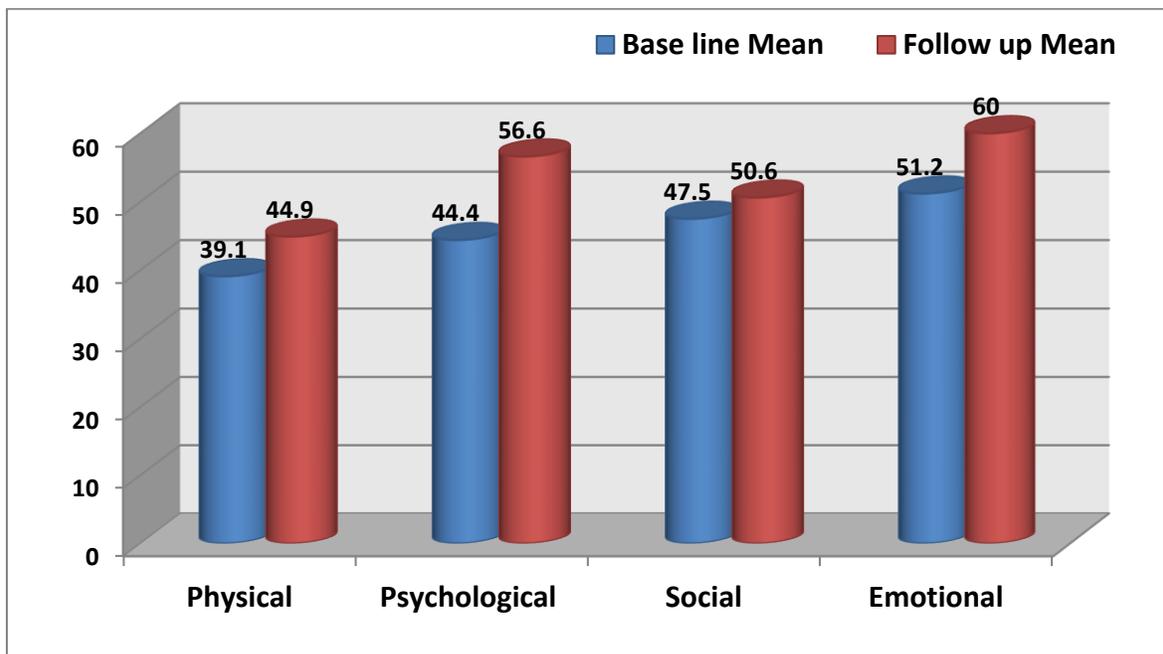


Fig:2 Comparison of mean scores of variables base line and follow up of WHOQOL (BREF)

V. DISCUSSION

Tuberculosis (TB) studies have concentrated on clinical outcomes only few studies have examined the impact of TB on patient's Quality of Life (QOL). It is therefore very important to improve QOL in diseased states. The current study was an attempt to assess the Health Related Quality of Life (HRQOL) in TB patients

The study was conducted on 40 TB patients and their QoL scores were measured by WHOQOL (BREF) and SF-36 questionnaire.

VI. WHOQOL (BREF):

Present study reveals that, the Means SD scores of WHOQOL(BREF) of psychological health at base line was 44.35 ± 13.20 , at follow up was 56.60 ± 14.95 and environmental at base line was 51.17 ± 10.60 , at follow up was 60.00 ± 8.09 and p-value < 0.001 , which is very highly significant.

The Mean SD scores of physical health at base line was 39.12 ± 11.61 , at follow up was 44.97 ± 20.42 and social relationships at base line was 47.52 ± 8.28 , at follow up was 50.60 ± 4.6 and p-value < 0.05 , which is statistical significant.

SF-36:

Present study reveals that, the Mean SD score of SF 36 of physical health at base line was 33.87 ± 21.16 , at follow up was 53.0 ± 21.10 and role limitations due to emotional problems at base line was 49.22 ± 38.61 , at follow up was 81.27 ± 27.36 and p-value < 0.001 , which is very highly significant.

The Mean SD scores of role limitations due to physical health at base line was 25.63 ± 45.23 , at follow up was 48.12 ± 30.30 , emotional wellbeing at base line was 67.22 ± 15.39 , at follow up was 75.40 ± 8.62 and pain at base line was 39.0 ± 10.22

at follow up was 46.17 ± 16.71 and p-value < 0.01 , which is statistically highly significant.

The Mean SD scores of energy / fatigue at base line was 38.55 ± 9.78 , at follow up was 42.37 ± 13.27 , social functioning at base line was 49.0 ± 16.23 , at follow up was 53.87 ± 18.36 and general health at base line was 48.12 ± 8.56 , at follow up was 49.57 ± 9.18 and p-value > 0.05 , which there was no statistical significant difference.

Patient counselling is one of the most important aspects in developing patient's knowledge about disease, management, precautions and improving overall quality of life.

In our study 5 deaths were reported, this is due to TB disease along with co-morbidity of other lung diseases such as hydropneumothorax, pneumonia and lung consolidation.

Among the 40 patients 2(5%) patients were shifted to CAT- II ATT because of relapse of therapy (defaulter) of CAT-I.

Highest WHOQOL –BREF mean scores had been observed for the domain psychological health and environmental health and the least mean score is observed in physical health and social relationships. Physical health is most affected due to worsened symptoms of disease. Social relationships are more affected due to the isolation of patients. Highest SF-36 mean scores were observed in emotional well-being and role limitations due to emotional problems it is possible only by the patient education regarding disease. The most affected health scale in energy / fatigue followed by pain these are due to nature of the disease.

The results of the present study states that vigorous activities such as running or lifting heavy objects, climbing several flights of stairs, and walking more than a kilometer were limited a lot for most of TB patients. Most of the time they had to cut down the amount of time spent on work and accomplished less than they would have liked to achieve, similar results they reported in a study conducted in Sudan where TB effect long distance moments of TB patients in their activities were limited due to their health¹⁹.

The pharmacist provided education showed a positive and effective improvement in patients Health Related Quality of Life in TB.

VII. CONCLUSION

The results of the present study concluded that TB patients had poor HRQOL inspite of receiving new care strategies, the disease had a negative impact on HRQOL of TB patients across all domains.

Our study concluded that although HRQOL improved with treatment, the scores on component summary measures showed compromised physical health and energy/ fatigue among the study patients even at the end of the follow-up. Consideration of related factors can have an effective role in improving HRQOL in TB patients.

Higher the social and family support we can expect better quality of life of the patients.

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A Comparative Study of Self-esteem and Depression among orphans and children living with their parents in Rupandehi district, Nepal

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Abstract: Parents play an important role in a child's life. They provide for physical, emotional and social needs which are required for the holistic development of the child. But losing parents at an early stage of life can have disastrous impact on the overall development of the child. Even though the child is provided an alternate option of being in an institutional home but a huge gap exists in the fulfilment of psychological needs and well-being. Several studies have supported that this gap can lead to behavioural issues and psychological problems like depression, aloofness, reticence in the child. The aim of the study is to assess the level of self-esteem and depression among orphans and children living with their parents. For this purpose, a comparative study was undertaken. The convenience sample included 40 orphans and 40 children living with their parents. The instrument used was Rosenberg's Self-Esteem and Children's Depression Inventory. Data was collected from various institutions that take care of the orphan children and children living with their parents from Rupandehi district of Nepal. T ratio was applied on the data and results also proved that there is significant difference between the level of self-esteem and depression among the orphans and children living with their parents.

Keywords: Orphan, Children living with their parents, Self-esteem, Depression

Introduction

Childhood is the stage in which the child forms a secure relationship with their parents which is important for their psychological and social development.

Having parents is a blessing and a gift of unconditional love, acceptance and encouragement for the child but children growing up without their parents have become a common sight around the world. It is estimated that the number of orphans worldwide had reached 153 million in 2013 (UNICEF). AIDS epidemic, civil war, poverty, natural disaster, abandonment and accidents are among the leading causes of children becoming orphans.

The trauma that follows after losing a parent has the long-lasting effects on the child. Lack of support during the grieving time and inadequate help in adjustment to an environment without their parents increases the risk of emotional and behavioural disorder, depression, anxiety etc. A 2000 Journal of child psychology and psychiatry and allied disciplines study found that about 1 out of every 5 children who have lost a parent will develop a psychiatric disorder.

Research has indicated that parent loss in childhood is associated with significant problematic consequences (Bowlby, 1980; Harris, 1995)

Parental death may lead to a reduction in social support which is also related to poorer health. (House, Umberson and Landis, 1988)

Ragan and McGlashan (1986) found that participants who grew up in families where one or both parents die were more likely to have difficulty forming stable adult relationships.

Further research has shown that parental death may increase the likelihood of alcohol and drug abuse in adulthood. (Dennehy, 1966)

Studies have been done to examine the long-term impact of early parental death and it was found that children develop certain type of psychopathology in the adulthood. (Berlinsky and Biller, 1982)

Orphanages are institutions for the care of a child who has lost his/her parent. Many studies have shown that children raised in the orphanage, report more depressive symptoms than children reared at home. Other research had found that orphans are more

anxious, less optimistic about the future and more likely to express their aggressive feelings. They have disrupted behaviour as compared to non-orphans.

Studies have shown that children living in the orphanages home are at greater risk for long term negative impact on their social, emotional and cognitive development.

Institutionalized children have also been found to have difficulties in forming an integrated self-concept (Kodandaram and Rao 1983). They develop maladaptive characteristics that include low self-esteem, self-rejection, identity confusion, alienation and distrust (Mwebze Micheal,2007).

Further research in the Nepali context is required because nothing much has been done to understand more about the impact of institutionalization on the behaviour and attitude of the children residing in orphanage home. Early diagnosis and timely intervention are needed to alleviate and alienate their suffering and improve the quality of their lives. Further this research will provide insight to program planners and policy makers to review and change/ strengthen existing care and support programs for children in the orphanage home.

Review of Literature

In 1996 in the Rakai district J Sengendo et al. investigated the psychological effect of orphan hood in a sample of 193 children. According to their findings, non-orphans were more optimistic about the future while orphans showed significantly higher level of depression.

Dr.M. Nasar Sayeed Khan, Dr. Masha Asad Khan, Rabia Majeed in 2004 did a study in Lahore on 240 adolescents where non orphan children reported higher level of self-esteem than orphan children.

Kedly (2006) pointed out that orphans had greater risk of anxiety, depression, anger, fear, stigmatization, stress, irritability, fugue, offending and hyperactivity.

Seggane Musisi et.al (2007) in Uganda did a study on 420 orphans and non-orphan children. It was found out that orphans exhibited common emotional and behavioural problems than the non-orphans. Further orphans were described as “needy, sensitive, isolative with low confidence and self-esteem and protection, identity, security, play, food and shelter.

A study done by Yashmin Nilofer Farooqi and Marina Intezar in 2009 in Lahore city of Pakistan on 150 children found that the orphan children reported lower self-esteem as compared to the children living with their parents.

Azza Ibrahim et.al (2011) did a study in Egypt on 200 orphans found out that orphans have high rate of depression than children reared at home. Girls were about 46 times more likely to have depression than boys.

Rabia Majeed et.al (2014) did a study on 240 adolescents aged between 13-19 years that was divided into three groups namely non orphans, Institutionalized orphans and non-institutionalized orphans. It was found out that there is no significant difference in dependency, self-esteem, self-adequacy, emotional responsiveness and emotional stability among the three groups.

Tamara V. Avakyan et.al (2014) did a study on 123 teenagers in Moscow found out that orphan children show high level of depression, anxiety and social anxiety than the children living in families.

A study done by Markos Abiso Erango et.al (2015) in Ethiopia on orphan children aged between 7-18 years. It was found out that the orphan children have low self- esteem.

Eyerusalem Hadush (2015) did a study in Ethiopia on 196 children out of which 112 were orphans and 84 were non-orphans. It was found out that institutionalized children reported high depression and low self-esteem than the non-orphans.

Mifrah Rauf Sethi and Madiha Asghar did a study in Peshawar, Pakistan in 2015 on 325 children out of which 150 were orphans and 175 were non-orphans with the age range of 13-16 years. It was found out that orphan children have higher level of self-esteem as compared to non-orphans.

Nasir Mohamad Bhat did a study on 210 children aged between 13-17 years in the Kashmir valley of India in 2015 found that orphans have high level of depression as compared to non-orphan children.

Ganavi Ramagopal et.al (2016) in India found out that children living in the orphanage reported 35% depression and majority were females.

Mr.Siyad.B.R., Mr. Muneer.P did a study on 200 orphans and non-orphan children in 2016 from Trivandrum district, age ranging between 8-14 years. The orphan children reported lower self-esteem than the children living with their parents.

Mashkoor Ahmad Lone, Dr. P Ganesan did a study on 160 orphan and non-orphan children in Jammu and Kashmir, India in 2016. It was found out that orphan children reported lower self-esteem than family reared children.

A study done by Dr. P Ganesan et.al (2017) in Anantnag district of Jammu and Kashmir in India, found out that the orphan children reported lower self-esteem than family reared children.

Ranjith Kannan et.al (2017) did a study in Tamil Nadu in India on 221 orphans and 221 school going children. High level of self-esteem was seen more among school going children compared to orphanage children.

Sanurizwanie Mat Sahad, Zakaria Mohamad, Madhihah Mohamad Shukri did a study on 240 orphans and non-orphans adolescents in Malaysia in 2018. The result found out that orphans have higher emotional problems such as depression, anxiety and stress than the non-orphans.

Gamechu Shiferaw, Lemi Bacha, Dereje Tsegaye in Ilu Abba Bor Zone, South West Ethiopia in 2018 found that depression was high in females than males.

Archana Vinnakota et.al (2018) in India did a study on 150 adolescents. It was reported that depression among institutionalized children was significantly higher compared to children living with their families.

Eaprodite Nsabimana et.al (2019) did a study in Rwanda on 178 children out of which 94 were orphans and 84 lived with their families. It was found out that children living in an institution showed lower self-esteem than the children living with families.

METHODOLOGY

Objectives of the study:

The present study will be carried out to achieve the following objectives:

- To find out the relationship between self-esteem and depression among children living with parents and children living in orphanage.
- To see the differences in self-esteem and depression level in children living in orphanage and children living with their parents.

Hypothesis:

- a) Children living in orphanage will score higher on Children's Depression Inventory (CDI) as compared to those living with their parents.
- b) Orphans will score significantly lower on Rosenberg Self-Esteem Scale as compared to children living with their parents.
- c) There will be significant relationship between self-esteem and depression among children living with parents and children living in institutional homes.

Sample:

The total number of participants were 80. Samples were drawn from the institutional homes and children living with their parents of Rupandehi district, Nepal. The sample included (n=40) institutionalized orphans and (n=40) children living with their parents.

Inclusion and exclusion criteria

Inclusion criteria for orphan children

- Age range between 8-17 years
- Both genders
- Willingness to participate in the study
- Must be living in orphanage for the past 6 months

Exclusion criteria for orphan children

- Recently added in orphanage
- Intellectual impairment and other developmental disorders and organic illness
- Physically handicap

Inclusion criteria for children living with parents

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- Age range between 8-17 years
- Both genders
- Willingness to participate in the study
- Living with both parents

Exclusion criteria for children living with parents

- Intellectual impairment and other developmental disorders and organic illness
- History of parental loss due to death or divorce

Tools:

The following tools were used:

- 1) Rosenberg’s Self Esteem Scale (Dr. Rosenberg,1989)
- 2) Children’s Depression Inventory (Dr. Maria Kovacas,1992)

Description of Tools

1.Rosenberg’s Self Esteem Scale (RSES, Dr. Rosenberg,1989): It is a 10-item scale ranging from strongly agree to strongly disagree. It has test-retest correlations ranging from .82 to .88. Cronbach’s alpha from various samples has a range of .77 to .88.

2.Children’s Depression Inventory (CDI, Dr. Maria Kovacas,1992): It is a 27-item scale which is self-rated. It is widely used for assessing the severity of depression symptoms in children and youth. The scale has alpha measures of 0.71-0.89 which reflects good internal consistency.

Procedure:

Formal permission was obtained from Nepal Avinash Anath Kendra, Bal Kalyan Griha and Atama Shanti Anathashram to draw the sample of orphans from Rupandehi district. Moreover, formal permission was also obtained from private school of Rupandehi district to draw the sample of children living with both the parents. A consent form was obtained from each institution. Rapport was established with the respondents assuring them of confidentiality of their personal information would be used for research purpose exclusively. The self-esteem Scale and Children’s Depression Inventory was administered individually to all the research participants in order to determine the level of their self-esteem and depression

Research Tool:

Statistical Analysis: Data was analysed using SPSS software. T test was applied to compare the self-esteem and depression among the orphans and the children living with parents.

Result:

Table 1:

Variables	N	Mean	Standard Deviation	Standard Mean	Error
Self-esteem of Orphans	40	12.7500	4.92898	.77934	
Self-esteem of Non-Orphans	40	21.5500	3.03780	.48032	

The result shows there is significant difference in the level of self-esteem between the orphan and non-orphan children. T ratio is significant at level 0.05

Table 2:

Variables	N	Mean	Standard Deviation	Standard Mean	Error
Depression level of Orphans	40	19.7250	4.31448	.68218	
Depression level of Non-orphans	40	5.0500	3.97395	.62834	

The result shows there is significant difference in the depression among orphans and non-orphans. T ratio is significant at the level 0.05

Discussion:

The current study investigated the level of self-esteem and depression of orphan children and children living with both the parents. The finding of the study suggest that orphan children reported low self-esteem (M=12.75 and SD=4.92) and high depression (M=19.7 and SD=4.3) as compared to the children living with their parents (Self-esteem M=21.5 and SD=3.03 and Depression M=5.05 and SD=3.97).

Similar studies have also revealed that children living in orphanage homes have low self-esteem and high level of depression because institutionalized children may face several problems such as caregiver may not provide what is important and necessary for the children in the orphanage.

Berger (2003) reported that some of the problems encountered by children living in the orphanages homes including psychological stress, negative impact on academic, loss of inheritance and as a result of these and other burdens children are exposed to depression, low self-esteem and alienation.

Mutiso (2008), in a study in Kenya on institutionalized children in rural and urban settings demonstrated significantly higher prevalence rates of depression symptoms among orphan children compared with non-institutionalized ones.

Panicker (2006) A child's relationship with his parents determines how the child defines himself, as loss of parental figure results in the halted identification of self.

High prevalence of depression level may be related to the orphanage environment such as the feelings of mistrust, insecurity, risk of neglect, abuse and exploitation.

Conclusion:

The finding of this research suggests that there is a significant difference in the level of self-esteem and depression of the orphans and the children living with the parents. The orphans reported low self-esteem and high depression than the children living with their parents.

Limitations:

The sample size taken was small and the results may not be generalized.

Implications:

- Regular psychological assessment of children should be carried for early detection and proper management of any mental abnormalities.
- Various programmes should be conducted by the government to raise awareness among caregiver about the importance of psychological needs of the orphans and consequences of psychological problems like depression and low self-esteem or any behavioural problems.
- Caregiver of these institutions should be trained to provide psychological support to such children.
- Government should conduct counselling session on 'how to increase self-esteem of these children' and 'how to enhance their mental health'.
- The findings from this study will help the policy makers to understand the importance of improving orphan's psychosocial well-being.

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Developing an M-Voting System for Political Party Elections in Kenya

A thesis submitted in partial fulfilment of requirements for the award of the Degree of Master of Science in Information Technology, Department of Information Technology, Moi University

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Abstract- Elections world over represent the opinions and the voice of the people (Pettit, 2004; Dave, 2011), and there is always the need to put in place a system promotes public participation on election processes and present the outcome of the voting exercise accurately and timely (Keeter et al., 2002). The current voting systems have numerous issues, such as usability, accessibility and security with limited alternatives (Hodges, 2014). The use of a printed ballot remains one of the oldest and the most popular voting methods across the world, but it has faced significant challenges over time, with issues such as lack of mobility, susceptibility to voting booth mistakes, and human manipulation, (Runbeck et al., 2008). The aim of this study was to evaluate the current voting systems used by political parties in Kenya with a view to developing a mobile (SMS) based voting system for party elections to complement the existing systems. The research revealed various limitations that confirms the existing literature. The system was modelled and tested for efficiency, using one hundred volunteers who were able to cast their votes through text message. The system demonstrated that a mobile phone based voting system is viable and can provide an alternative channel during voting in democratic elections, with greater efficiency.

Index Terms: e-voting: electronic voting, GSM: Global System for Mobile communication, m-voting: mobile voting, OMR: Optical mark recognition, PVC: paper based voting system, SIM: Subscriber identity module, SMS: short message service

I. INTRODUCTION

The main voting system used in Kenya is the Printed ballot. This method of voting have in the past been marred with various challenges such as very long queues at the polling centres, missing names from the voter register, standing long hours during voting at the polling station and very slow voting process (Andreassen et al., 1993; BBC, 2013). In Uganda, during Electoral Commission's voter register display in 2015, one hundred and nine (109) polling centers were missing from the voter register, and in another center, the names of people with disabilities (PWDs) appeared in the main registers while those without disabilities appear in the PWDs' register (Daily Monitor, 2015). The above problems clearly bring out the serious limitations of paper ballot voting system that should be addressed in order to make voting exercise less cumbersome and stress free. Mobile technology is another technique that has been tested to enhance voting efficiency. E-voting voting systems can be deployed to complement the inefficient and error-prone manual voting systems (Kohno et al., 2004). Different democracies have implemented different forms of electronic voting (e-voting) systems, and such systems have evolved over time, to counter the emerging challenges (Gold, 2012). Such systems include Biometric Voter Registration, Lever Voting Machines in India, Punched Cards for Voting in United States, and Direct Recording Electronic (DRE) voting (Breckenridge, 2010). Paper based voting system is expensive, vulnerable to natural or human phenomenon and inefficient (Kumar & Srivastava, 2010); considering the above problems and opportunities, a lot of research has been on-going and should be encouraged, in order to come up with a voting mechanism which is cost effective, secure, and convenient to the voters (Kumar & Suresh, 2011).

In the last decade, there has been a widespread growth of mobile wireless networks, applications, and services (Demombynes & Aaron, 2012). This has ushered in the era of mobile computing, where handheld computing devices have become the predominant choice for users. Low-cost affordability of portable devices such as cell phones, palmtops and their widespread usage are motivating various industry players to provide various services to mobile users (Demombynes & Thegeya, 2012). A very consistent trend has been witnessed in the banking sector where mobile phones have been used to perform financial transactions, a clear indication that mobile phones have become part of modern life, and can be explored further as a primary tool for voting during elections (Au & Kauffman, 2008).

Elections And Voting In Kenya

Electoral and voting processes in Kenya have undergone significant transformation over time (Branch, & Cheeseman, 2009). In 1988 for instance, the then Kenya ruling party KANU instituted the *mlolongo* (queuing) system of voting, in which voters lined up publicly behind an image of their chosen candidate or party (Sjögren et al., 2014, East African Standard, 24th 1988). This denied voters a secret voting and even the right to abstain. According to the previous national election in Kenya, statistics revealed that a voting system has direct impact on voter turnout. The voter turnout in 1988 for instance was a record low of only 32.5 per cent, as compared to 45.9 per cent in 1983 and 67.3 per cent in 1979, a factor that could directly be attributed to the queuing system in 1988 (Jones, 2003; Muriungi, 2005). In the last decade the most predominant voting system has been the paper ballot voting. It involves casting the vote using paper ballot where each voter writes in the name of a candidate or select the candidate of their choice from the pre-printed sheets with names of the candidates, and inserts into the ballot box one vote at a time (Mayur Patil, 2013). The manual voting is usually marred with very many challenges such as long queues at the polling centers as was witnessed in 2013 general election (British broadcasting corporation (BBC), 2013).

Mobile Phone Technology

The mobile phone technology has evolved significantly in Kenya over the last two decades. The revolution has transformed the lives of Kenyans, providing not just communications but also basic financial access in the form of phone-based money transfer, led by the M-PESA system introduced in 2007 (Thegeya, 2012). By end of 2014, the mobile phone penetration rate in Kenya was 80.5 per cent, with majority of mobile phone owners comfortable using their phones to perform financial transactions on M-PESA and mobile banking (Demombynes & Thegeya, 2012). Due to the popularity and ease of use of these mobile devices, it would be necessary to take advantage of the technology and develop a prototype mobile voting system that would significantly enhance the existing paper based voting systems.

It is evident that traditional voting systems have significant challenges that cannot be left unaddressed, at the same time, there is a clear indication that the available technologies can and have been used to improve the voting process. In view of the foregoing, the researcher found it necessary to investigate the challenges faced in the current voting systems in Kenya, in order to provide an ICT based solution that would improve the voting experience.

Voting Systems

Voting method can be classified into two broad categories, paper based, and electronic voting. The paper voting systems include paper ballots and, punch cards; while electronic voting includes mobile voting and internet voting systems (Dimitris, 2012).

Mobile Phone Voting

Mobile voting refers to a voting process that involves casting of votes through mobile devices such as mobile phones, tablets, or personal digital assistant (PDA). Mobile voting (m-voting) is considered to be an electronic voting system which removes the inherited limitations of the traditions and the e-voting systems that required, in many cases, the physical existence of the citizens, and polling officials in the polling location (Ekong, 2010). With the mobile technology, voters who for different reasons, may not be able to go to the voting booths physically, are able to use mobile technology to cast votes remotely (More, et al., 2015), and vote tallying done through computer systems (Galal, 2012). Figure 1 below presents a mobile phone voting system architecture using GSM infrastructure.

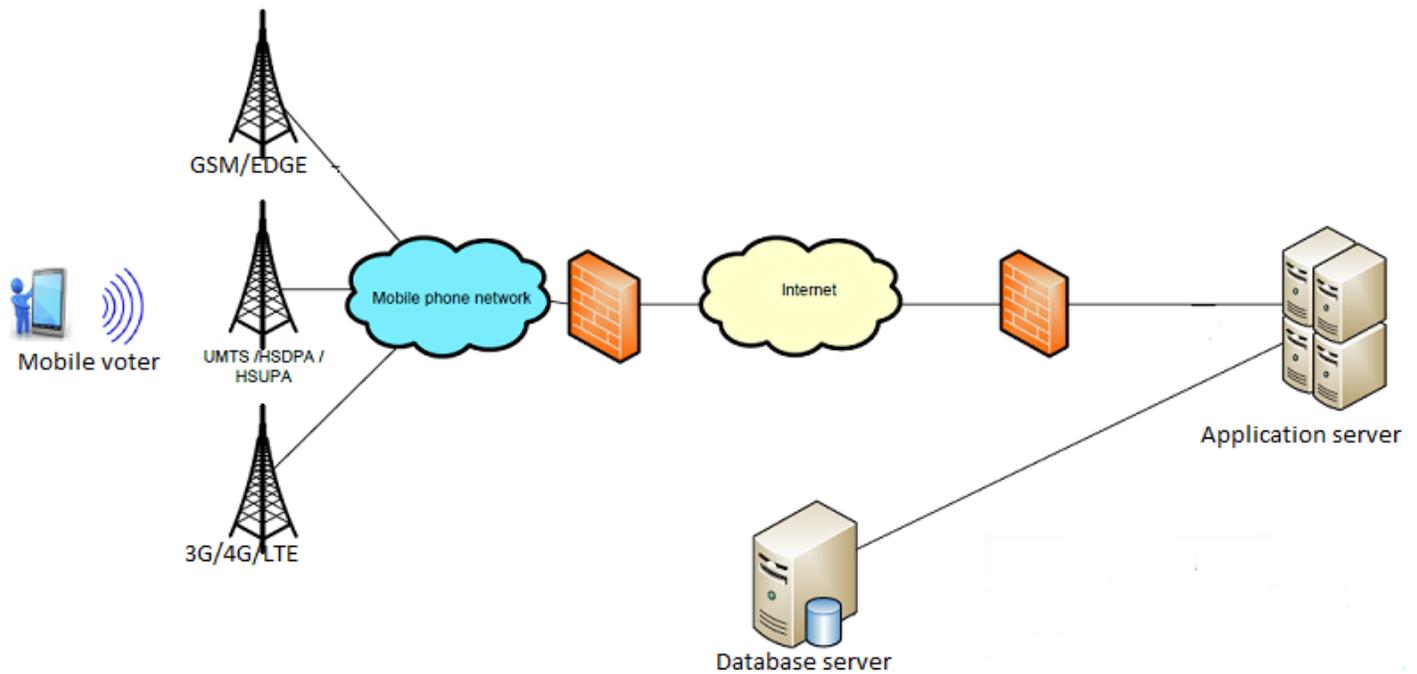


Figure 1: M- Voting architecture; source: www.researchgate.net

Mobile voting provides an additional platform to the electronic voting systems. It is an initiative with tremendous potentials to enhance democratic participation and also serve as an enabler and a convenient way to involve citizens in political decision making, as well as providing a cheaper, convenient and a simple system to administer (Ekong, 2010).

Benefits of Mobile Voting

Mobile phone based voting system have a range of advantages that benefits the citizen, the political players and the government. Some of benefits that can be obtained if voting is conducted through mobile phones are: Possibility for increased efficiency, flexibility and reduced cost; at the same time the system can be used alongside other voting systems (Bouras et al., 2003; Brücher & Baumberger, 2003). Mobile voting could give elections new potential by providing ballots in multiple languages, accommodating lengthy ballots, facilitate early and absentee voting, thus enhancing democratic process (Dimitris, 2003); It has the ability to reduce fraud, by eliminating the opportunity for ballot tampering, ballot stuffing, and ballot miscount (Rubin, 2002; Panda, et al., 2013). People with disabilities gain a new alternative for voting privately, independently, and with dignity, at their own pace; at the same time, it would increase the ease of voting for citizens who are otherwise geographically isolated from election centres (Gamatié, 2014).

Research findings

The system was considered in two main modes, before election (normal mode) and during election (Election mode), as described in Figure 2 below. The normal mode entails all activities undertaken by the system users and the system before the actual casting of votes; such as voter registration, registration of candidates, and verification of voter list as well as creation of elections. The contestants are also issued unique public ID that will be used to cast votes on their favour at this stage. The election mode entails events that occur during voting exercise such as casting of ballots, voter authentication, and tallying.

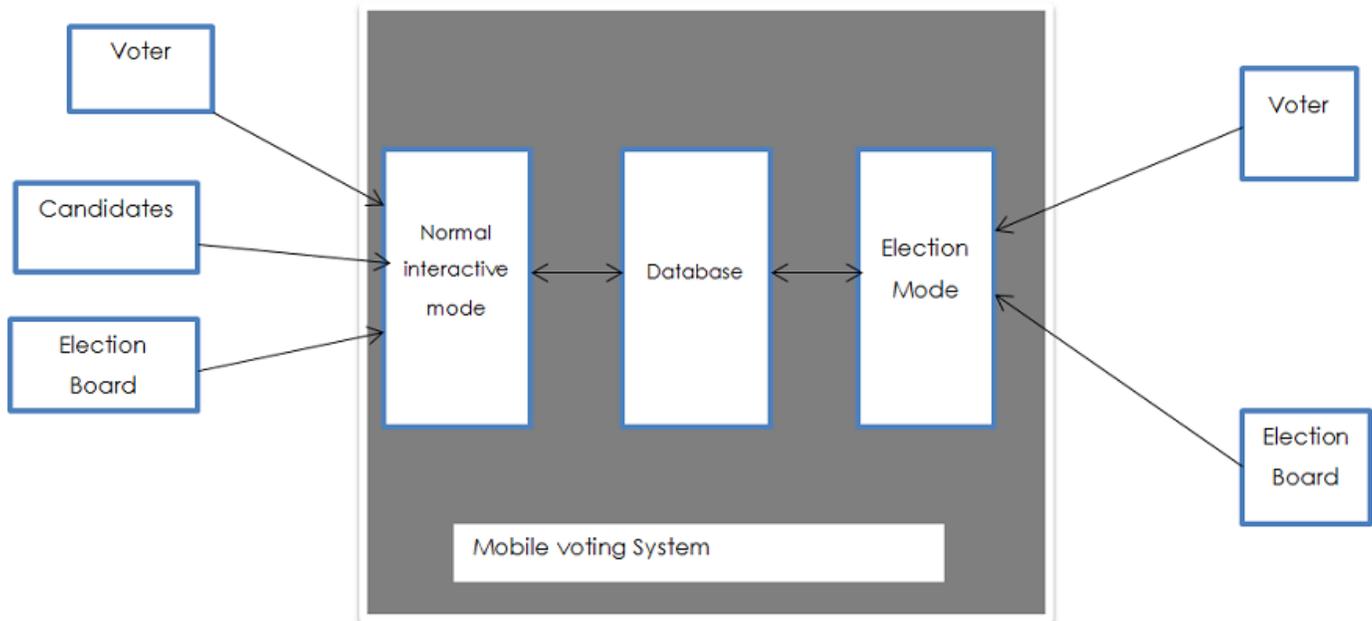


Figure2: Block diagram showing interaction between users and the system

The normal mode provides a web interface through which users interact with the system to enrol voters and contestants and perform all pre-election operations. Once the system is turned into election mode, the database is locked for any editing and the system is ready to receive, validate, and tally voted and display the results through a web interface in real time.

The screen captions below displays the output of mock election conducted by the volunteers; over one hundred votes were cast to different candidates within five minute, where all the votes cast were processed and results displayed instantly an evidence of great efficiency and flexibility when using mobile phones to cast votes.



Figure 3: Real time voting results within five minutes in a mock election in a Constituency for four candidates

Majority of voters, admit that the current paper based voting system has its own limitations such as slowness especially when voting for several candidates, missing records and difficulty to use among the illiterate voters. Voters were also dissatisfied with the current vote tallying process where votes are collected and counted in a central tallying center. The main concerns raised are slow tallying process, mistrust of the vote tallying officials due to deliberate human errors and voting booth mistakes. All the respondents confirmed to be in possession of a working mobile phone and would be excited to use a mobile phone based voting system. The study revealed that many voters still face challenges with manual voting system, where over 50% of respondents complain of the efficiency in terms of speed. Another major issue that comes out is trust on the manual tallying process with voters, where human error and tallying speed have come out as the main concerns to the voters. The availability of the mobile phones and ease of use was evident among most voters; typically, all the voters interviewed own a mobile phone. Majority of the voters (60%) would use their mobile phones to cast votes if concerns such as voter manipulation by system administrators and election officials are addressed. The main concerns to the electorates about mobile voting are security of the system against both external and internal threats, as well as lack of understanding on the technology. A mock election conducted by the volunteers who were requested to cast votes randomly in favour of different candidates within a period of five minutes showed that that over 100 votes could be processed within one minute, demonstrating great efficiency, accessibility and convenience of mobile phone voting as compared to traditional voting systems.

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From Integrated to Disembedded: Diachronic Analysis of Socio-Sanitary Integration

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Abstract: The increased utilization of new media technologies applied to health care and assistance (welfare, home care, psychological health) is determining the epistemological uprooting of their traditional meanings by introducing, on the contrary, a rise of applications that determines an increasingly active patient involvement in the implementation of care pathways and healing. In this sense, the patient must supervise the protocols, which characterize the hetero-direction of qualified personnel within the different social and health services in the previous era.

Index Terms - Disembedding, Homecare service, Integrated Home Care Service, The un-embedding

INTRODUCTION

The increased utilization of new media technologies applied to health care and assistance (welfare, home care, psychological health) is determining the epistemological uprooting of their traditional meanings by introducing, on the contrary, a rise of applications that determines an increasingly active patient involvement in the implementation of care pathways and healing. In this sense, the patient must supervise the protocols, which characterize the hetero-direction of qualified personnel within the different social and health services in the previous era. The establishment and aggravation of tickets, difficulty in finding a bed (regardless of severity of illness), as well as the very long waiting lists for the performance of clinical and laboratory findings, are the figures of the crisis caused by the continuous spending review of the Health Department in Italy. Neither the amount of public spending (750 billion euros), nor the amount of public debt (more than 2000 billion Euros), or its relationship with the GDP for 2014 (132%), bode well, as well as maintain, the amount of current welfare: the reduction of the stock of public debt and tax burden (more than 45%) passes through the spending review in the "social spending."

LITERATURE

Integrated Home Care Service

The assistance share that we will analyze relates to the complexity and level of completeness: in fact, the difference between Homecare Service (hereinafter AD)¹, the Domiciliary Hospitalization (hereafter OD)², and Integrated Home Care Service (hereinafter ADI) consists precisely of finding a more evolved and complex care, which requires the coordination of different professional and well-structured skills. The ADI was defined by the WHO as "the possibility to provide at the patient's home services and instruments that contributes to maintain the highest level of well-being, health and function" and is characterized by the integration of services offered, including its multidisciplinary nature: participation and synergy of different professional profiles, related to the welfare of the user/patient (medical and paramedical personnel, social workers, psychologists, social workers, etc.).

In Italy, the AD began in 1970, with the personnel dedicated to carry out domestic activities and basic care. The early 1990s marked the increase of the senile population in Italy and the exponential growth of HIV infection. These factors "advised" home care, leading to substantial changes in response to acute illness and much more articulated needs than in the past, and thus, more structured and "integrated" performances.

In this perspective, the ADI was presented as an alternative to inappropriate hospitalization, and although untimely, may be preferred for the economic benefits it might offer.

¹ The Italian National Health Service guarantees assistance paths at their own residence or so-called "home care" to those who are not self-sufficient and are in weak conditions, with pathologies in progress or as result of them..

² The home hospitalization is a type of assistance that consents to guarantee the patient with all the health service normally provided in the hospital.

Ultimately, the diachronic analysis on home services in our Country can be fully carried out with the tripartite proposal from Gori and Casanova (2009):

- I. Pioneering phase - 1970s, 1980s - especially under the local aegis;
- II. **Consolidation phase** - 1990s - about 2% of the elderly enjoy AD;
- III. **Development stage** - 2000/2010 - about 5% of the elderly benefit from ADI.

To which we believe it should be proposed a further phase, by reason of the changes to which we are seeing, in light of the changes to which the society is continually subjected in its entirety:

- IV. **Unbundling phase** - current years - which does not want to be juxtaposed to the integrated home care, rather than stating its different characteristics.

From the point of view of those governing the endogenous and exogenous dynamics, which this integrated system has to face, for some time now, we have been witnessing in our country (and particularly in South Italy) the perpetuation of a paradoxical situation: on one hand, the increase of social demand for health services, and on the other hand, a fragmentation of the same, due to a deep and ongoing economic crisis.

Moreover, in the outlined scenario, the "simple" integrated system, whose epistemological roots are found in the multi-dimensionality of the Parsons (1995) AGIL scheme, related to the components of the "politics" of the "public," the "private," and the "private-social" sector, and is no longer in condition to guarantee the same welfare that has historically characterized the appearance of the *welfare state* and its evolution in the *welfare mix*³: the care for health is one of the duties assigned to the society, while to the structures remains a definitely residual role (Parsons, 1995).

The un-embedding

The configuration of the era that best represents the current social peculiarities is the "late modernity," which Giddens (1990), mainly inspired by Beck (2008) and Bauman (2000), aims to highlight the radicalization of the modernity crisis. The changes that have occurred during the last decades, in fact, do not represent the passing of an era toward this next, but a radicalization of the main features of modernity: "we're not out of the modernity yet, but we have to look again to his nature because, instead of going toward a post-modern era, we are entering an era in which the consequences of modernity are becoming more radical and universal" (Giddens, 1990, p.16).

One of these consequences, perhaps the most important, is the un-embedding from the time and space. Modernity has produced an eradication of the social reality of time and space, which was developed traditionally. However, studies on the socio-economic impact of telemedicine remain superficial and not very numerous. According to Pushkin and Sanders (1995), this lack of studies is attributable to three factors: problems in technological infrastructure, telecommunication, and infrastructure organization. The divergence with respect to crucial issues has produced conflicting tendencies: Eco (2001) represents these alliances between "apocalyptic" and "integrated," identifying the median solution as solver of the controversy: the intellectual position. The relationship with the new technologies produces four categories, according to Minnini (2002), in which place individuals based on the use of new media: 1) *Techno-utopic*, who see new media as a tool of liberation and growth, in opposition to or in passing of the real communities; 2) *Techno-anti-topic*, who see new media as a tool of oppression and control, which is considered necessary for their control and their regulation; 3) *Techno-utilitarian*, which considers the new media instrumental to reach better or before a certain goal; *Techno-pluralist*, which seeks to enforce the moral autonomy and psychosocial experience of the new medium, but in the awareness that new media do not replace the experience of the face-to-face relationship, but are placed as a new space of exploration and relation. Thus, it is possible that while recognizing the magnitude, convenience, and results, we investigate on the effects of medium- to long-range clarification of an original type of interaction in the field of social and health care, based on the distance of the dyad doctor/patient - aka the proximity at distance (Severino, 2013)? And what will it be of the placebo (and nocebo) effect? Can we still benefit from its usefulness ?

The home care disaggregated

The tele-medicine, in this sense, may be an integral part of the redesign of the organizational structure and service network in the country (Italy), whose original motivation certainly does not reside in the interest of replacing an established practice entrusted to the presence, but by the purely economic objective to obsessively track moderation, even if legitimate and justified. A typical example of the application of ICT is the field of tele-medicine, which allows us to offer counseling and medical treatment to patients, regardless of their physical location. This practice is particularly useful when you need to provide sophisticated medical care via satellite to patients located in remote rural areas or in areas affected by natural disasters. Thus, epiphanies heuristics services, in addition to the "simple" drop in the volume of care, are asserted in response to the chronic shortage of *welfare*.

³ It is an idea of Welfare Stare plurality in a restrictive way as a simple reference to the augmented variety of subjects involved in providing social services.

Distinguished by a *performance* of interventions and services offered to users at their residences, in view of the contemporary technological configuration, we become witness to the specular consonance between what happens in the late-modernity (disaggregation) and what is being structured within the basic level of health and social care, with particular relevance in the definition of the modality of care supply which supports innovative forms of home care. Some examples: tele-nursing, tele-medicine, tele-cardiology, tele-aid, virtual admit, tele-psychology, tele-social comfort, tele-electroencephalography, tele-dialysis, tele- ambulance governing, tele-diabetes, tele-radiology, tele-dermatology, and tele-perinatal monitoring. The significant aspects of psychological and sociological matrix, as well as the disaggregated form of assistance, meet the economic policies of practicing restraint, and do not longer support the formula *here and now* of performance – either institutionalized or at home - typical of face-to-face interaction, but rather focusing on the disaggregated type: clarify the social welfare and health services professional relationships, from local contexts and traditional aid relationship and their reorganization through procedures, therapies and protocols structured on indefinite arcs of space-time. *Therefore, the eradication manifested also in the social and health care integration creates a new kind of community and professional relatedness, separated from the site and the interpersonal presence: the disaggregated care, who, suffering from "sociological imagination" (Mills, 1959), we considered in identifying in the ADD.* Finally, it is important to keep in mind that the technology should be to be adapted to different user needs and not vice-versa. If the focus is on the assessment of technological processes, rather than on the eventual user's ability to use it, then the sin of incommunicability of the science which studies, paradoxically, the human-machine interaction, or better yet the degree of usability, is committed. The usability problem arises when the model of the designer (or the ideas of these with respect to the operation of the product, which transfers on *design*) does not coincide with the pattern of the end-user (the idea that the user conceives of the product and its operation). The degree of usability rises proportionally to the rapprochement of the two models (model designer and user model), which further depends on its degree of *affordance* (Gibson, 1979). "Tele-" is a prefix which is the first element of several scientific terms and means "distance" that hardly can refer to the meanings and feelings of inclusion. A group appointed by the EU developed the first definition of tele-health: *integration, monitoring, management and education of patients and health care personnel through systems that allow ready access to expert advice and information concerning the patient, regardless of where they physically reside.* The debate revolves around a barycenter question about the relevance of remote assistance; in other words, if the remote assistance provided through a telematics platform can really be considered as one that is present. We are convinced that there are no legal defects on the exercise of distance assistance, especially on the technical-professional aspect, as, indeed, we are aware of some research findings that demonstrate not only the efficiency of the procedure but also the effectiveness of the therapeutic method. However, scientific research requires repeated and rigorous validations. The reference is to the methods of sampling, the survey methodology, the various "conditioning effects," as well as the interpretation of the results, which should be devoid of the so-called self-fulfilling prophecy (Merton, 1948).

Each new medium produces the resistances that have, as a consequence, an imbalance, which in the case of ADD is linked to the possibility of access to technology: a division normally called *digital divide* (Warschauer, 2003, p. 1).

METODOLOGY

The pilot-research methodology

The pilot-research moves in analyzing the ADI and the ADD, in a town in the Sicilian hinterland (region of South Italy), with the aim of examining the dimension of the offer to the assisted and the innovative practices used to cope with new problems of home care. The methodology is qualitative: it avails oneself by the construction of a research *setting* based on a small "non-probabilistic" collective (Corbetta, 1999) of the chosen type (De Rose, 2003), characterized by individual cases emerged from six (3 +3) semi-structured interviews. Below (Table 1), we propose a scheme of the research participants:

Table 1. Research participants broken down by type of home care received.

Type of home care	ADI	ADD
Assisted	3	3
	Angela (76 years)	Carmelo (76 years)
	Girolamo (83 years)	Ada (70 years)
	Anna (79 years)	Antonietta (72 years)

The will to analyze the AD aspects, focusing either on the quality and the service supplied, has preferred an *insider* role, in order to conduct a thorough participatory analysis, even considering the possible degree of responsiveness due to the duration of the observation and our physical presence in the state of care needs of the user. Our participation allowed us to learn "to see something as something" (Wittgenstein, 1953, trans. It. 1967, p. 225) that, otherwise said, has allowed a partial form of socialization with the user and further attention to the study of the cases, so as to bring our body into play as an instrument of observation (Goffman, 1989, 2006,

p.109), while getting used to the contingencies we have observed. Therefore, it resulted in a "dialectical" relationship (Kemmis 1980) between observer and observed, such that the conceptual schemes of the first should have remained flexible and open in order to allow the researcher to reduce the complexity of the observed reality.

Participant observation

The establishment of a relationship of trust with patients allowed, in the first phase of the "participant observation," to identify their specific approach to technology, based on a series of test questions regarding their relationship with technology, with the equipment and science in general, identifying (as shown in Table 2) their possible membership in the "Minnini classification" (2002). The newness of the ADD is considered by users to be both an advantage and a disadvantage: some of them deal with the news as a benevolent "relief," as the mode involves a correspondence - even if technological - that intrigues, being suited to the task of assistance provided.

"I can keep quiet even if no one comes to see me...." (Antonietta, 72anni, ADD).

From the observations emerge, however, other users' concerns that are related to the proper functioning of the equipment made available to the ADD:

"I feel worried... if it does not work ?" (Ada, 70, ADD).

In addition, receiving a daily operator's phone call does not allow them to be quiet about the dangers of their health risk, but considers it to be, at best, an opportunity to

"tell a little of the lonely" (Ada, 70, ADD).

In addition to the above, we must add the total disbelief, shown a few times, in considering the electronic methods that are scarcely efficient, as they do not guarantee a timely control of the situation of danger to the user or of additional remote services:

"The science goes on, but I do not understand some things... how does a relative of mine to be alerted timely if I am sick?" (Girolamo, 83, ADI).

"they should consider when we are sick and when we need only company" (Angela, 76, ADI)

Many of them live in the condition of assistance as though it were a *status* of absolute dependence, thus, in assessing the objective of the assistance, they believe that:

"Home care is a cure for our sick condition (...) In fact, if we did not have it, our health would be much more precarious, better keep my ailments under control..." (Girolamo, 83, ADI).

"Nurses come at home without me going out, it is a situation that I like because I do not always have the strength to do it and I feel well assisted" (Angela, 76, ADI).

"My conditions, since I am old, do not improve, but at least I have the satisfaction that someone takes care of my health.." (Carmelo, 76, ADI).

Therefore, an awareness by the users emerges, as the possibility to use assistance with special medical care directly at their own domiciles is seen to be greatly beneficial. Regarding the ADI, many users consider it to be more effective, because it is dispensing "live" for a specific user's necessity. The fact that professionals are personally met allows them to create a family relationship that borders with benevolence and allows to bridge social gaps and family.

".. If it were not for the nurse to remember my duty.... How many times I would forget the pill" (Girolamo, 83, ADI).

"... These operators are like family now... we walked into the confidence... I also prepare the coffee for them!..." (Angela, 76, ADI).

"... Having a presence home it is a comfort for me..." (Anna, 79, ADI).

The ADD raises curiosity among some interviewed, on both methods of completing the steps (use of equipment, technical assistance, etc.), both of uncertainty mixed with the discomfort, of not fully understanding the electronic novelties of which this formula consists of. In fact, they consider "being searched" as an important trait, while not accepting the presence of an operator:

".. I am glad that every morning the phone rings to know about my conditions... it's beautiful!" (Carmelo, 76, ADD);

"... At least, I do a nice chat with the operator, so I spend the day!..." (Ada, 70, ADD).

There remain, however, serious questions about the definition of safety and relief, which may be received from specific treatments, as well as from human contact; something that ADD can provide. In fact, the ADD interviewed responds not to have knowledge of the operators who provide the assistance service at distance, but that their job is related.

"at the company on the phone in case of need" (Ada, 70, ADD).

RESULTS

The result of these observations has allowed us to consider how their positions could be defined conversely, according to the classification previously established, which allowed placing users depending on the use and consideration of the technology in the home environment. In this regard, it has become important to determine a clear categorization:

Table 2. Categorization based on the users' media utilization (Minnini, 2002).

	ADI	ADD	Classification
Ada (70 years)		✓	Techno-utopic
Carmelo (76 years)		✓	
Angela (76 years)	✓		Techno-anti-topic
Girolamo (83 years)	✓		Techno-utilitarian
Anna (79 years)	✓		
Antonietta (72 years)		✓	Techno-pluralist

What emerges is the conditioned confidence of ADD users in technology as flexible for times and modes, in the life of the individual, considering the improvement in quality and independency using satisfaction objectives as to that carried out in their presence. On the contrary, the ADI users show a general distrust toward the technological approach, putting them in a dystopian perspective, or averse to anything that is not implemented in the concrete and limiting the use to the usefulness restricted by circumstances. What emerges from the consideration of the comparison between ADI and ADD is a close correlation between the age of the users (slightly younger than the ADD) and the diversity of assistance provided to them. In fact, the assisted ADD has greater physical and personal autonomy, which allows him to make himself still sufficiently free to move, whereas for the ADI, assistance is no longer possible because they need continuous support in presence. In this regard, the diversity of their condition affects the relationship with the use of technology applied to everyday life, considering it in the first, emancipatory, while in the latter as oppressive and worthy of a limitation in use.

CONCLUSION

The two modes of home care, while valid in their application and prosaic, are in need of an appropriate distinction, which allows to investigate and track down those "*characters of effectiveness, efficiency and equity*" (Donati, 2003, p.281) that can really differentiate each other and allow us to trace the ability to meet the minimum and absolute requirements of health protection, without forgetting to connect in a meaningful way the health needs and the size of the family and personal life. In fact, a serious disregard of all these prerogatives could fall into the risk of administering a service only when necessary, by losing sight of important considerations such as the relief to the patient, even in cases of extreme need. The technology, therefore, should be reconsidered in light of human needs, and the needs of users can be more quickly filled by a better integration between presence and distance.

What will be verified in the future is not only the manner in which the care and assistance will be provided, but also the quality of human relationships addicted to these, in order to verify and supplement the traditional "hospital practice", remote ways of support and assistance, providing a relational reconnection and a concrete combination of the different formulas, whose association could lead to satisfaction levels that are useful and necessary for the well-being of the user. It is believed that there may be much enlarged boundaries in the detection of diseases to which the placebo could find application and benefit with respect to an improvement of the health status of a patient, if not its complete healing, and these are related to mental, psychosomatic, and somatic diseases. The relevance of the effects of proxemics interdependence and in coexistence with the help relationship (doctor-patient) is enhanced further by the demonstration of a direct inverse effect (of opposite direction and reverse), when we were in the presence of an attitude and anxiety-inducing behavior (Ficarra et al., 2013) of the doctor (or perceived as such by the patient) or by the development of the same relationship set incorrectly: the nocebo effect.

However, the quota component of the placebo (and nocebo) in therapy may vanish in the absence of the deep structure of the interaction (in the ADD). Furthermore, "*the most important role of the Internet in the structuring of social relations is its contribution to the new model of sociability based on individualism [...]. Thus, it is not Internet to create a model of individualism in the network, but its development that provides a material support suitable to spread the individualism in the network as the dominant form of sociability*" (Castells, 2001, p. 129).

Thus, it is not so much the use of Internet potential, or much less the information technology that determines what we called ADD, as the use and abuse of the applicability of the network potential, in the absence of the deteriorating effects that any excessiveness determines. At un-embedding, which may be opposed to re-embedding, reconstruction of social and cultural ties and a re-connection of the actions to its traditional contexts of interaction and their time/space recombination, in order to re-establish a sense of continuity and order in the events, including the so-called ADD, occur. If this has happened, happens, or will happen, then we could say that the

goal set by the National Health Plans has been, is, or will be reached: *to treat at home means a substantial change of perspective*. It is to pass from the patient that revolves around the structures and supplying systems, the structures, to the systems and professions that take as center of gravity the person with its specific, unique and unrepeatable individual needs.

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The Gumbel Marshall-Olkin-Weibull distribution: Properties and applications

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Abstract- In this paper, a new Gumbel generated Weibull distribution is introduced. The statistical properties including the quantile function, moments about the origin, incomplete moment and entropy of the new distribution are studied. The unknown parameters of the new distribution are estimated using the maximum likelihood approach. Furthermore, the asymptotic consistency behavior of the maximum likelihood estimates of the new distribution is evaluated through Monte Carlo simulation. Finally, the applicability and the potentials of the new distribution are illustrated in two real-life data sets.

Index Terms- Gumbel distribution, Marshall-Olkin distribution, Moments, Reliability, Maximum likelihood

I. INTRODUCTION

To provide adequate fit for real life data sets using classical distributions has proved difficult due to the heterogeneity of such data sets from assumed homogeneous population. Many of the classical distributions have been made more flexible to provide adequate fit to data sets by extending or introduction of additional parameter. There is increasing number of new distributions in the literature; however, of great importance is the ability to provide adequate fit to ever dynamic sample data from many different areas of study.

A class of distributions called a new Gumbel generated family of distribution having density function (pdf) given in (1) was proposed by [21].

$$G(x) = \exp \left[-B p^{\frac{1}{\sigma}} \left(\frac{F(x)}{1-F(x)} \right)^{-\frac{1}{\sigma}} \right]; \quad (1)$$

where $B = \exp \left(\frac{\mu}{\sigma} \right)$.

Our intention is to extend the Weibull distribution using equation (1). However, there are good number of distributions in the literature that were generated by either extending or introducing additional parameter to Weibull distribution such as but not limited to exponentiated Weibull proposed by ([5],[14]), Marshall-Olkin extended Weibull proposed by [10], beta- Weibull introduced by [7], Kumaraswamy Weibull introduced by [6], Gamma-Weibull introduced by [8], Transmuted Weibull by [12], Gumbel-Weibull [9], The Topp-Leone generated Weibull introduced by [11], the Lindley Weibull by [13].

This paper aims at generating a flexible distribution with unimodal, bimodal, skewed, monotone increasing and decreasing pdf shapes, and among many other failure rate shapes, bathtub shape as shown in Figure 1 and 3.

The importance and areas of applicability of bimodal distribution were highlighted by [2] and references therein. Furthermore, [3] and [2] noted that class of lifetime distribution having a bathtub shape failure rate function is very important in the study of lifetime of electronic, electromechanical, mechanical products, and survival analysis; see also [4].

The remainder of paper is structured as follows. The new distribution is derived in section 2. In section 3, we considered moments of the new distribution. Reliability functions are derived in section 4 while the entropy is considered in section 5. The parameter estimation is considered in section 6. In section 7, real-life applications are considered. Finally, section 8 is the concluding remark.

II. THE NEW DISTRIBUTION

Consider the pdf $F(x)$ of a random variable defined by

$$F(x) = 1 - \exp \left[- \left(\frac{x}{\theta} \right)^{\lambda} \right]; \quad x, \theta, \lambda \in \mathbb{R}^+. \quad (2)$$

The cdf of the new distribution called the Gumbel Marshall-Olkin Weibull is generated by substituting equation (2) in equation (1), and it is given by

$$G(x) = \exp \left[-Bp^{\frac{1}{\sigma}} \left(\exp \left[-\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right)^{-\frac{1}{\sigma}} \right] \quad (3)$$

The density function (pdf) of GMO-W is obtained by taking the derivative of equation (3) with respect to (w.r.t) x and it is given by

$$g(x) = \frac{Bp^{\frac{1}{\sigma}} \lambda x^{\lambda-1} \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right]}{\sigma \theta^{\lambda} \left\{ \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right\}^{\frac{1}{\sigma}+1}} \times \exp \left[-Bp^{\frac{1}{\sigma}} \left(\exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right)^{-\frac{1}{\sigma}} \right] \quad (4)$$

Proposition 1: If random variable Y follows Gumbel distribution, then random variable $X = \theta[\ln(p e^Y + 1)]^{\frac{1}{\lambda}}$ follows Gumbel Marshall-Olkin Weibull distribution.

Proof

The pdf of random variable Y is given by

$$f(y) = \frac{\exp \left(\frac{y-\mu}{\sigma} \right) \exp \left[-\exp \left(\frac{y-\mu}{\sigma} \right) \right]}{\sigma}$$

We have that if $x = \theta[\ln(p e^y + 1)]^{\frac{1}{\lambda}}$ then $y = \log \left[p^{-1} \left(\exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right) \right]$ and $\frac{dy}{dx} = \frac{\lambda x^{\lambda-1}}{\theta^{\lambda} \left(1 - \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] \right)}$.

By transformation, the pdf of x is defined as

$$g(x) = f(y) \left| \frac{dy}{dx} \right| \quad (5)$$

Substituting the values of y and $\left| \frac{dy}{dx} \right|$ in equation (5) yields

$$g(x) = \frac{Bp^{\frac{1}{\sigma}} \left\{ \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right\}^{-\frac{1}{\sigma}}}{\sigma} \times \exp \left(-Bp^{\frac{1}{\sigma}} \left\{ \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right\}^{-\frac{1}{\sigma}} \right) \frac{\lambda x^{\lambda-1}}{\theta^{\lambda} \left(1 - \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] \right)}$$

Simplifying further, we obtain the pdf of X as

$$g(x) = \frac{Bp^{\frac{1}{\sigma}} \lambda x^{\lambda-1} \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right]}{\sigma \theta^{\lambda} \left\{ \exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right\}^{\frac{1}{\sigma}+1}} \times \exp \left[-Bp^{\frac{1}{\sigma}} \left(\exp \left[\left(\frac{x}{\theta}\right)^{\lambda} \right] - 1 \right)^{-\frac{1}{\sigma}} \right].$$

End of proof.

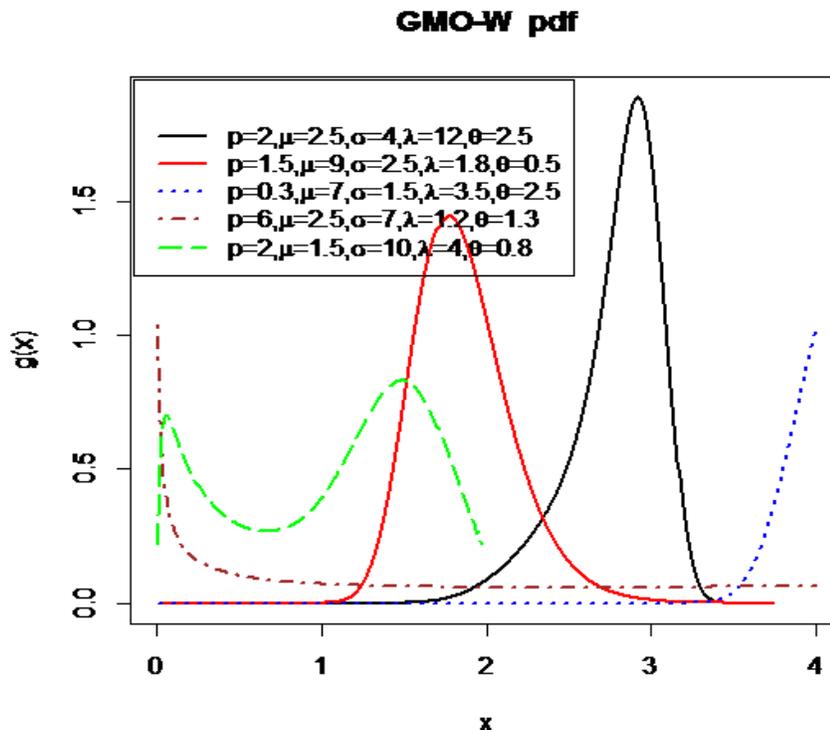


Figure 1. Plots of GMO-W pdf for different parameter values.

III. STATISTICAL PROPERTIES

In this section, we derived some of the statistical properties of the GMO-W distribution.

A. Quantile Function

The quantile function of GMO-W denoted by $Q(u)$ is obtained by applying the probability integral transform on equation (3) and it is given by

$$Q(u) = \theta(\ln\{1 - pB^\sigma[\ln(u)]^{-\sigma}\})^{\frac{1}{\lambda}}, \quad u \in (0,1). \quad (6)$$

We can obtain the α^{th} percentile by substituting appropriately the corresponding values in equation (6). For instance, the 50th percentile which is the median (M) can be obtained by substituting the corresponding value $u = 0.5$ in equation (5), this yields

$$M = \theta(\ln\{1 - pB^\sigma[\ln(0.5)]^{-\sigma}\})^{\frac{1}{\lambda}}.$$

By equation (6), we can obtain an alternative measure of kurtosis proposed by [15] and defined as

$$k = \frac{Q\left(\frac{7}{8}\right) - Q\left(\frac{5}{8}\right) + Q\left(\frac{3}{8}\right) - Q\left(\frac{1}{8}\right)}{Q\left(\frac{6}{8}\right) - Q\left(\frac{2}{8}\right)}$$

Figure 1 shows the plots of GMO-W and Weibull kurtosis at respective parameter values $p = 0.5, \mu = 0.5, \sigma = 3, \lambda = 0.5$ to $3, \theta = 0.1$ to 10.1 and $\lambda = 0.5$ to $3, \theta = 0.1$ to 1 . Figure 1 plot reveals that GMO-W has heavier tail than the Weibull distribution.

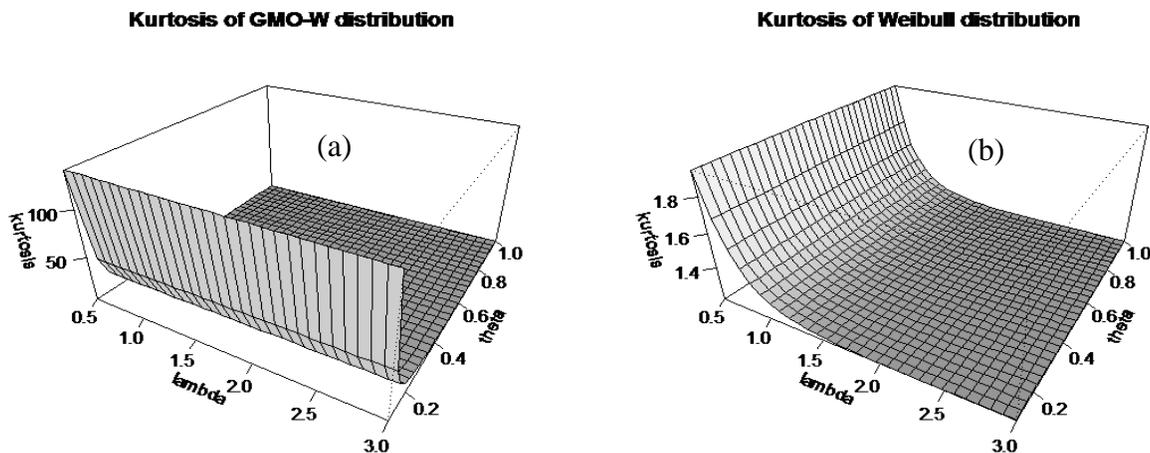


Figure 2. Plots of Kurtosis a) GMO-W b) Weibull distribution.

B. Moments

The n^{th} moment about the origin say μ'_n of a random variable X having GMO quantile function of GMO-W is defined as

$$\mu'_n = E(X^n) = \int_0^\infty x^n g(x) dx \quad (7)$$

where $g(x)$ is as defined as in equation (4). Substituting equation (4) in (7) and applying the general binomial series expansion that

$$\mu'_n = \frac{Bp^{\frac{1}{\sigma}}}{\sigma\theta^\lambda} \sum_{i,j=0}^\infty \frac{(-1)^i}{i!} (Bp^{\frac{1}{\sigma}})^i \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \times \int_0^\infty x^{n+\lambda-1} \exp\left[-\left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \left(\frac{x}{\theta}\right)^\lambda\right] dx \quad (8)$$

Letting $y = \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \left(\frac{x}{\theta}\right)^\lambda$, implies that $x = \frac{\theta y^{\frac{1}{\lambda}}}{\left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right)^{\frac{1}{\lambda}}}$ and $dx = \frac{\theta y^{\frac{1}{\lambda}-1}}{\lambda\left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right)^{\frac{1}{\lambda}}} dy$. By change of variable, equation (8) becomes

$$\begin{aligned} \mu'_n &= \frac{Bp^{\frac{1}{\sigma}}\theta^n}{\sigma\left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right)^{\frac{n}{\lambda}+1}} \sum_{i,j=0}^\infty \frac{(-1)^i}{i!} (Bp^{\frac{1}{\sigma}})^i \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \times \\ &\int_0^\infty y^{\frac{n}{\lambda}} \exp(-y) dy \\ &= \frac{Bp^{\frac{1}{\sigma}}\theta^n}{\sigma\left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right)^{\frac{n}{\lambda}+1}} \sum_{i,j=0}^\infty \frac{(-1)^i}{i!} (Bp^{\frac{1}{\sigma}})^i \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \times \\ &\Gamma\left(\frac{n}{\lambda} + 1\right) \end{aligned}$$

The n^{th} incomplete moment was proposed by [16] to determine the shape distribution. The n^{th} incomplete moment for a random variable X with pdf $f(x)$ is defined as

$$I(w; n) = \int_{-\infty}^w x^n f(x) dx$$

If X follows GMO-W, then the n^{th} incomplete moment is defined by

$$I(w; n) = \int_0^w x^n g(x) dx; \quad (9)$$

where $g(x)$ is defined as in equation (4). Applying the general binomial series expansion to equation (9) yields

$$I(w; n) = \frac{B\lambda p^{\frac{1}{\sigma}}}{\sigma\theta^\lambda} \sum_{i,j=0}^{\infty} \frac{(-1)^i}{i!} \left(Bp^{\frac{1}{\sigma}}\right)^i \binom{\frac{i}{\sigma} + \frac{1}{\sigma} + j}{j} \times \int_0^w x^{n+\lambda-1} \exp\left[-\left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \left(\frac{x}{\theta}\right)^\lambda\right] dx \quad (10)$$

Applying change of variable in the integral above by letting $q = \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \left(\frac{x}{\theta}\right)^\lambda$, equation (10) becomes

$$\begin{aligned} I(w; n) &= \frac{B\lambda p^{\frac{1}{\sigma}} \theta^n}{\sigma \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right)^{\frac{n}{\lambda}+1}} \sum_{i,j=0}^{\infty} \frac{(-1)^i}{i!} \left(Bp^{\frac{1}{\sigma}}\right)^i \times \\ &\quad \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \int_0^w q^{\frac{n}{\lambda}} \exp(-q) dq \\ &= \frac{B\lambda p^{\frac{1}{\sigma}} \theta^n}{\sigma \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right)^{\frac{n}{\lambda}+1}} \sum_{i,j=0}^{\infty} \frac{(-1)^i}{i!} \left(Bp^{\frac{1}{\sigma}}\right)^i \times \\ &\quad \left(\frac{i}{\sigma} + \frac{1}{\sigma} + j\right) \left(\Gamma\left(\frac{n}{\lambda} + 1\right) - \Gamma\left(\frac{n}{\lambda} + 1, w\right)\right). \end{aligned}$$

For $n = 0$, equation (9) becomes equation (3).

C. TRIMMED-L MOMENT

The Trimmed-L (TL) moments was proposed by [17] as a robust method of estimation for population central moments. The n^{th} TL-moment of a random variable X with respective cdf $F(x)$ and pdf $f(x)$ for $t_1 = t_2 = t$ is given by

$$\lambda_n^t = \frac{1}{n} \sum_{k=0}^{n-1} (-1)^k \binom{n-1}{k} E(Y_{n+t-k:n+2t}); \quad n = 1, 2, \dots \quad (11)$$

where

$$E(Y_{i:m}) = \frac{m!}{(i-1)!(m-i)!} \sum_{j=0}^{m-1} (-1)^j \binom{m-1}{i} \times \int_{-\infty}^{\infty} x f(x) F(x)^{i+j-1} dx$$

Substituting $f(x)$ and $F(x)$ in equation (11) with equations (4) and (3) respectively, applying the general binomial series expansion, the n^{th} TL moment of GMO-W can be expressed as

$$\begin{aligned} \lambda_n^t &= \frac{B\lambda p^{\frac{1}{\sigma}}}{n\sigma\theta^\lambda} \sum_{k=0}^{n-1} (-1)^k \binom{n-1}{k} \frac{(n+2t)!}{(n+t-k-1)!(t+k)!} \times \\ &\quad \sum_{i=0}^{t+k} (-1)^i \binom{t+k}{i} \sum_{j,m=0}^{\infty} \frac{(-1)^j}{j!} \left[(n-t-k+i)Bp^{\frac{1}{\sigma}}\right]^j \times \\ &\quad \left(\frac{j}{\sigma} + \frac{1}{\sigma} + m\right) \int_0^{\infty} x^\lambda \exp\left[\left(\frac{j}{\sigma} + \frac{1}{\sigma} + m\right) \left(\frac{x}{\theta}\right)^\lambda\right] dx \quad (12) \end{aligned}$$

By change of variable in the integral of equation (12), the n^{th} TL moment of GMO-W is given by

$$\begin{aligned} \lambda_n^t &= \frac{B\theta p^{\frac{1}{\sigma}}}{n\sigma} \sum_{k=0}^{n-1} (-1)^k \binom{n-1}{k} \frac{(n+2t)!}{(n+t-k-1)!(t+k)!} \times \\ &\quad \sum_{i=0}^{t+k} (-1)^i \binom{t+k}{i} \sum_{j,m=0}^{\infty} \frac{(-1)^j}{j! \left(\frac{j}{\sigma} + \frac{1}{\sigma} + m\right)^{\frac{1}{\lambda}+1}} \times \end{aligned}$$

$$\left[(n - t - k + i) B p^{\frac{1}{\sigma}} \right]^j \left(\frac{j}{\sigma} + \frac{1}{\sigma} + m \right) \Gamma(\lambda + 1)$$

At $t = 1$ and $n = 1, 2, 3, 4$, the TL-moment corresponds to measures of location, scale, skewness and kurtosis respectively.

IV. RELIABILITY

The hazard rate function (hrf) of a random variable X is defined by $hrf = f(x)/1 - F(x)$. The corresponding hrf of GMO-W random variable is given by

$$hrf = \frac{B p^{\frac{1}{\sigma}} \lambda x^{\lambda-1} \exp \left[\left(\frac{x}{\theta} \right)^\lambda \right]}{\sigma \theta^\lambda \left\{ \exp \left[\left(\frac{x}{\theta} \right)^\lambda \right] - 1 \right\}^{\frac{1}{\sigma} + 1}} \times \frac{\exp \left[-B p^{\frac{1}{\sigma}} \left(\exp \left[\left(\frac{x}{\theta} \right)^\lambda \right] - 1 \right)^{-\frac{1}{\sigma}} \right]}{1 - \exp \left[-B p^{\frac{1}{\sigma}} \left(\exp \left[\left(\frac{x}{\theta} \right)^\lambda \right] - 1 \right)^{-\frac{1}{\sigma}} \right]}$$

Figure 3 shows the plots of GMO-W hazard rate function with different parameter values.

Suppose the life of a component which has a random strength X_1 and it is subjected to random stress X_2 . The component survives the stress whenever $X_1 > X_2$ hence, $R = P(X_2 < X_1)$ measures the reliability of the component.

Let X_1 and X_2 follow GMO-Weibull, then

$$R = \int_0^\infty \frac{B p^{\frac{1}{\sigma}} \lambda x^{\lambda-1} \exp \left[\left(\frac{x}{\theta} \right)^\lambda \right]}{\sigma \theta^\lambda \left\{ \exp \left[\left(\frac{x}{\theta} \right)^\lambda \right] - 1 \right\}^{\frac{1}{\sigma} + 1}} \times \exp \left[-2 B p^{\frac{1}{\sigma}} \left(\exp \left[\left(\frac{x}{\theta} \right)^\lambda \right] - 1 \right)^{-\frac{1}{\sigma}} \right] dx \quad (13)$$

Simplifying equation (13) yields

$$R = \frac{B p^{\frac{1}{\sigma}} \lambda}{\sigma \theta^\lambda} \sum_{i,j=0}^\infty \frac{(-1)^i}{i!} \left(2 B p^{\frac{1}{\sigma}} \right)^i \binom{\frac{2}{\sigma} + j}{j} \times \int_0^\infty \exp \left[- \left(\frac{2}{\sigma} + j \right) \left(\frac{x}{\theta} \right)^\lambda \right] dx$$

$$= \frac{\theta^{-\lambda+1} B p^{\frac{1}{\sigma}} \lambda}{\sigma} \sum_{i,j=0}^\infty \frac{(-1)^i}{i!} \left(2 B p^{\frac{1}{\sigma}} \right)^i \binom{\frac{2}{\sigma} + j}{j} \frac{\Gamma \left(\frac{1}{\lambda} + 1 \right)}{\left(\frac{2}{\sigma} + j \right)^{\frac{1}{\lambda}}}$$

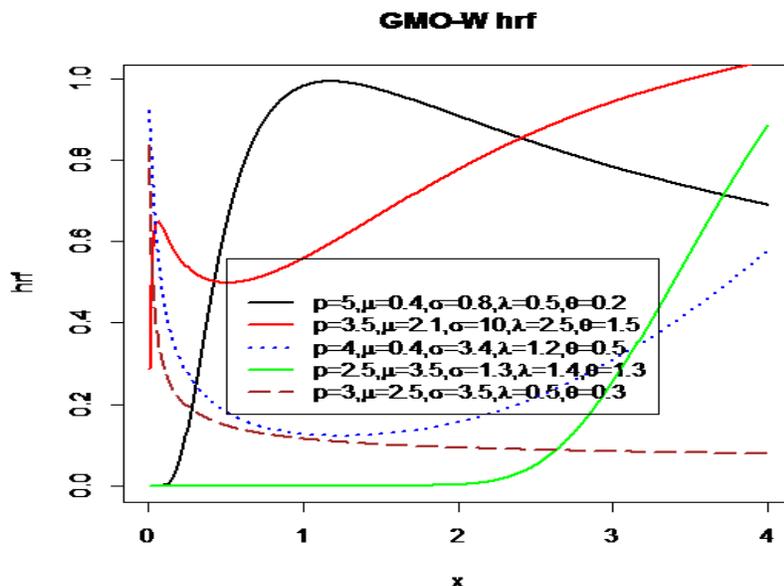


Figure 3. Plots of GMO-W hrf for different parameter values.

V. ENTROPY

The measure of uncertainty of random variable X having GMO-W pdf is determined using Renyi entropy. For a random variable X having pdf $f(x)$, the Renyi entropy introduced by [18] is defined by

$$I_R(\gamma) = \frac{1}{1-\gamma} \log \left(\int_{-\infty}^{\infty} f^\gamma(x) dx \right) \quad (14)$$

Substituting equation (4) in equation (14) yields equation (15) on simplification

$$I_{RGMO-W}(\gamma) = \frac{1}{1-\gamma} \log \left\{ \left(\frac{Bp^{\frac{1}{\sigma}}}{\sigma\theta^\lambda} \right)^\gamma \sum_{i,j=0}^{\infty} \frac{(-1)^i}{i!} \times \left(\gamma Bp^{\frac{1}{\sigma}} \right)^i \binom{\gamma \left(\frac{1}{\sigma} + 1 \right) + \frac{i}{\sigma} + j - 1}{j} \times \int_{-\infty}^{\infty} x^{\gamma(\lambda-1)} \exp \left[\left(\frac{\gamma}{\sigma} + \frac{i}{\sigma} + j \right) \left(\frac{x}{\sigma} \right)^\lambda \right] dx \right\} \quad (15)$$

Letting $w = \left(\frac{\gamma}{\sigma} + \frac{i}{\sigma} + j \right) \left(\frac{x}{\sigma} \right)^\lambda$ and by change of variable, the integral in equation (15) becomes

$$\frac{\theta^{\gamma(\lambda-1)+1}}{\lambda \left(\frac{\gamma}{\sigma} + \frac{i}{\sigma} + j \right)^{\frac{1}{\lambda}[1+\gamma(\lambda-1)]}} \Gamma \left(\frac{1}{\lambda} [1 + \gamma(\lambda - 1)] \right)$$

and the Renyi entropy for GMO-W becomes

$$I_{RGMO-W}(\gamma) = \frac{1}{1-\gamma} \log \left\{ \left(\frac{Bp^{\frac{1}{\sigma}}}{\sigma} \right)^\gamma \sum_{i,j=0}^{\infty} \frac{(-1)^i}{i!} \times \left(\gamma Bp^{\frac{1}{\sigma}} \right)^i \binom{\gamma \left(\frac{1}{\sigma} + 1 \right) + \frac{i}{\sigma} + j - 1}{j} \times \frac{\gamma^{\gamma-1} \theta^{1-\gamma}}{\left(\frac{\gamma}{\sigma} + \frac{i}{\sigma} + j \right)^{\frac{1}{\lambda}[1+\gamma(\lambda-1)]}} \Gamma \left(\frac{1}{\lambda} [1 + \gamma(\lambda - 1)] \right) \right\}.$$

VI. ESTIMATION

Let X_1, X_2, \dots, X_n be a random sample of size n drawn from GMO-W population. The log-likelihood function of the sample is given by

$$\begin{aligned} \ell(\theta) &= \frac{n\mu}{\sigma} + n \log\left(p^{\frac{1}{\sigma}}\right) + n \log(\lambda) + (\lambda - 1) \sum_{i=1}^n \log(x_i) \\ &+ \sum_{i=1}^n \left(\frac{x_i}{\theta}\right)^\lambda - \exp\left(\frac{\mu}{\sigma}\right) p^{\frac{1}{\sigma}} \sum_{i=1}^n \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\frac{1}{\sigma}} \\ &- n \log(\sigma) - n \lambda \log(\theta) \\ &- \left(\frac{1}{\sigma} + 1\right) \sum_{i=1}^n \log\left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right). \end{aligned} \tag{16}$$

The score functions $\left(\frac{\partial \ell(\theta)}{\partial p}, \frac{\partial \ell(\theta)}{\partial \mu}, \frac{\partial \ell(\theta)}{\partial \sigma}, \frac{\partial \ell(\theta)}{\partial \theta}, \frac{\partial \ell(\theta)}{\partial \lambda}\right)$ associated to equation (16) are given as follows

$$\begin{aligned} \frac{\partial \ell(\theta)}{\partial p} &= \frac{n}{\sigma p} - \frac{\exp\left(\frac{\mu}{\sigma}\right)}{\sigma} p^{\frac{1}{\sigma}-1} \sum_{i=1}^n \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\frac{1}{\sigma}} \\ \frac{\partial \ell(\theta)}{\partial \mu} &= \frac{n}{\sigma} - \frac{\exp\left(\frac{\mu}{\sigma}\right)}{\sigma} p^{\frac{1}{\sigma}} \sum_{i=1}^n \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\frac{1}{\sigma}} \\ \frac{\partial \ell(\theta)}{\partial \sigma} &= \frac{\mu \exp\left(\frac{\mu}{\sigma}\right)}{\sigma^2} p^{\frac{1}{\sigma}} \sum_{i=1}^n \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\frac{1}{\sigma}} - \frac{n}{\sigma} \\ &+ \frac{\log(p) p^{\frac{1}{\sigma}}}{\sigma^2} \exp\left(\frac{\mu}{\sigma}\right) \sum_{i=1}^n \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\frac{1}{\sigma}} \\ &- \frac{p^{\frac{1}{\sigma}}}{\sigma^2} \exp\left(\frac{\mu}{\sigma}\right) \sum_{i=1}^n \log\left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right) \times \\ &\left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\frac{1}{\sigma}} + \frac{1}{\sigma} \sum_{i=1}^n \log\left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right) \\ \frac{\partial \ell(\theta)}{\partial \theta} &= -\lambda \theta^{-(\lambda+1)} \sum_{i=1}^n x_i^\lambda + \frac{\exp\left(\frac{\mu}{\sigma}\right) p^{\frac{1}{\sigma}} \lambda \theta^{-(\lambda+1)}}{\sigma} \times \\ &\sum_{i=1}^n x_i^\lambda \exp\left[\left(\frac{x_i}{\theta}\right)^\lambda\right] \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\left(\frac{1}{\sigma}+1\right)} \\ &- \frac{n\lambda}{\theta} + \left(\frac{1}{\sigma} + 1\right) \lambda \theta^{-(\lambda+1)} \sum_{i=1}^n \frac{x_i^\lambda \exp\left[\left(\frac{x_i}{\theta}\right)^\lambda\right]}{\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1} \\ \frac{\partial \ell(\theta)}{\partial \lambda} &= \frac{n}{\lambda} + \sum_{i=1}^n \log(x_i) + \sum_{i=1}^n \left(\frac{x_i}{\theta}\right)^\lambda \log\left(\frac{x_i}{\theta}\right) + \frac{\exp\left(\frac{\mu}{\sigma}\right)}{\sigma} \times \\ &p^{\frac{1}{\sigma}} \sum_{i=1}^n \left(\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1\right)^{-\left(\frac{1}{\sigma}+1\right)} \exp\left[\left(\frac{x_i}{\theta}\right)^\lambda\right] \left(\frac{x_i}{\theta}\right)^\lambda \log\left(\frac{x_i}{\theta}\right) \\ &- n \log(\theta) + \left(\frac{1}{\sigma} + 1\right) \sum_{i=1}^n \frac{\exp\left[\left(\frac{x_i}{\theta}\right)^\lambda\right] \left(\frac{x_i}{\theta}\right)^\lambda \log\left(\frac{x_i}{\theta}\right)}{\exp\left[\left(\frac{x_i}{\sigma}\right)^\lambda\right] - 1} \end{aligned}$$

The maximum likelihood estimators for the unknown parameters of GMO-W distribution can be obtained by equating the score functions to zero and solving simultaneously for the respective parameters. However, the resultant equations are non-linear hence; the

maximum likelihood estimates can be evaluated by using non-linear iterative optimization method such as BFGS which is implementable in R statistical software.

The Fisher Information Matrix ($I_{GMOW}(\theta)$) can be obtain by taking the negative expectation of the second partial derivative of the log-likelihood with respect to parameter given by $-E\left(\frac{\partial^2 \ell(\theta)}{\partial \theta_i \partial \theta_j}\right)$. Under certain regularities $\sqrt{n}(\hat{\theta} - \theta)$ follows multivariate normal $N_5(0, V)$; where variance-covariance V is the inverse of the Fisher Information Matrix denoted by $I_{GMOW}^{-1}(\theta)$.

The asymptotic consistency of the maximum likelihood is evaluated through simulation study. Random samples of sizes $n = 50, 75, 100, 150, 200, 250$ are generated using equation (6) for $N = 500$ times with parameter values $\theta = (p = 2, \mu = 1.8, \sigma = 0.3, \lambda = 1.3, \theta = 0.2)$. For each N_i $i = 1, 2, \dots, 500$, parameter estimates $\hat{\theta}$ are determined and mean estimate, biases and mean square errors (mse) computed using :

$$mean = \frac{1}{N} \sum_{i=1}^N \hat{\theta}$$

$$bias = \frac{1}{N} \sum_{i=1}^N (\hat{\theta} - \theta)$$

and

$$mse = \frac{1}{N} \sum_{i=1}^N (\hat{\theta} - \theta)^2$$

Table 1 shows the results of the simulation study. The values in Table 1 indicate that as the sample size increases, the mean estimates tends to the true parameter values and the mse decreases as expected.

Table1. Result of simulation study

Sample size (n)	Parameter	Mean value	Bias	Mse
50	$p = 2$	2.0564	0.0564	0.7337
	$\mu = 1.8$	1.4452	-0.3548	4.4357
	$\sigma = 0.3$	0.6245	0.3245	0.8087
	$\lambda = 1.3$	4.5204	3.2204	96.0671
	$\theta = 0.2$	0.2027	0.0027	0.0199
75	$p = 2$	2.0661	0.0661	0.6418
	$\mu = 1.8$	1.5329	-0.2033	3.9769
	$\sigma = 0.3$	0.5329	0.2329	0.5287
	$\lambda = 1.3$	3.4518	2.1518	63.0859
	$\theta = 0.2$	0.1922	-0.0078	0.0163
100	$p = 2$	2.0318	0.0319	0.6341
	$\mu = 1.8$	1.5863	-0.2137	3.2444
	$\sigma = 0.3$	0.5011	0.2011	0.4342
	$\lambda = 1.3$	3.2395	1.9395	54.6662
	$\theta = 0.2$	0.1981	-0.0019	0.0141
150	$p = 2$	2.090	0.0981	0.3614
	$\mu = 1.8$	1.8360	0.0360	1.4709
	$\sigma = 0.3$	0.3966	0.0966	0.1409
	$\lambda = 1.3$	2.0468	0.7469	15.2519
	$\theta = 0.2$	0.1876	-0.0124	0.0091
250	$p = 2$	2.1436	0.1436	0.1809
	$\mu = 1.8$	2.0611	0.2611	0.6481
	$\sigma = 0.3$	0.3530	0.0530	0.0512
	$\lambda = 1.3$	1.5180	0.2182	3.5316
	$\theta = 0.2$	0.1718	-0.0282	0.0065

VII. APPLICATIONS

Two real-life data sets are used to illustrate the applicability and potentials of GMOW distribution to provide better fit among other existing distributions in the literature; Beta-Weibull (BW), Gamma-Weibull (GW), Exponentiated-Weibull (ExpW), Marshall-Olkin extended Weibull (MOW), Kumaraswamy-Weibull (KW), and Weibull distribution. The Cramer von Mises, Anderson darling, Akaike Information Criterion (AIC), and Kolmogorov-Siminov (K-S) goodness-of-fit statistics are used to determine the model of best fit. Generally, model with the least value of goodness-of-fit statistics is adjudged the best.

The first data set is on the lifetime of 50 industrial device put on life test. The data set is reported by [19]. The data set is given as Data set 1: 0.1, 0.2, 1.0, 1.0, 1.0, 1.0, 1.0, 2.0, 3.0, 6.0, 7.0, 11.0, 12.0, 18.0, 18.0, 18.0, 18.0, 18.0, 21.0, 32.0, 36.0, 40.0, 45.0, 45.0, 47.0, 50.0, 55.0, 60.0, 63.0, 63.0, 67.0, 67.0, 67.0, 67.0, 72.0, 75.0, 79.0, 82.0, 82.0, 83.0, 84.0, 84.0, 84.0, 85.0, 85.0, 85.0, 85.0, 85.0, 86.0, 86.0.

The second data set represent observed survival times (weeks) for AG positive. The data set is concave-convex and it is reported by [20]. The data set is given as data set 2: 65, 156, 100, 134, 16, 108, 121, 4, 39, 143, 56, 26, 22, 1, 1, 5, 65.

The parameter estimates and associated standard errors of the competing distributions are determined for the two data sets (Data set 1 and Data set 2); they are given respectively in Tables 2 and 4. Furthermore, the estimates goodness-of-fit statistics are given respectively in Tables 3 and 5 for Data set 1 and Data set 2.

Table 2. Parameter estimate (standard errors) for Data set 1

Distribution	Parameter Estimate (Standard errors)				
$GMOW(p, \mu, \sigma, \lambda, \theta)$	0.1713 (1.0837)	-0.2879 (6.8924)	18.2782 (2.0306)	5.0512 (0.0389)	40.8369 (0.0389)
$BW(a, \beta, \lambda, \theta)$	0.2216 (0.0543)	0.0555 (0.0084)	1.6764 (0.0032)	10.3829 (0.003)	
$GW(a, \lambda, \theta)$	1.4616 (0.1437)	0.6872 (0.0828)	69.5254 (22.1679)		
$ExpW(a, \lambda, \theta)$	0.1378 (0.0195)	5.1300 (0.0059)	87.1016 (0.9588)		
$MOW(p, \lambda, \theta)$	6.6762 (5.2876)	0.6994 (0.1499)	13.9565 (8.8993)		
$KW(a, b, \lambda, \theta)$	0.1557 (0.0212)	0.0634 (0.0091)	1.5445 (0.0123)	9.3740 (0.0132)	
$Weibull(\lambda, \theta)$	0.9489 (0.1195)	44.8762 (6.9396)			

Table 3. Goodness-of-fit statistics for Data set 1

Distribution	CvM	An	AIC	K-S
$GMOW(p, \mu, \sigma, \lambda, \theta)$	0.0974	0.8255	445.315	0.1289
$BW(a, \beta, \lambda, \theta)$	0.3000	1.9339	470.6071	0.1798
$GW(a, \lambda, \theta)$	0.5729	3.4035	462.8996	0.4953
$ExpW(a, \lambda, \theta)$	0.2459	1.6586	463.6542	0.2252
$MOW(p, \lambda, \theta)$	1.5570	7.9348	481.4148	0.9262
$KW(a, b, \lambda, \theta)$	0.3422	2.1868	476.6580	0.1732
$Weibull(\lambda, \theta)$	0.4947	3.0004	485.9592	0.1931

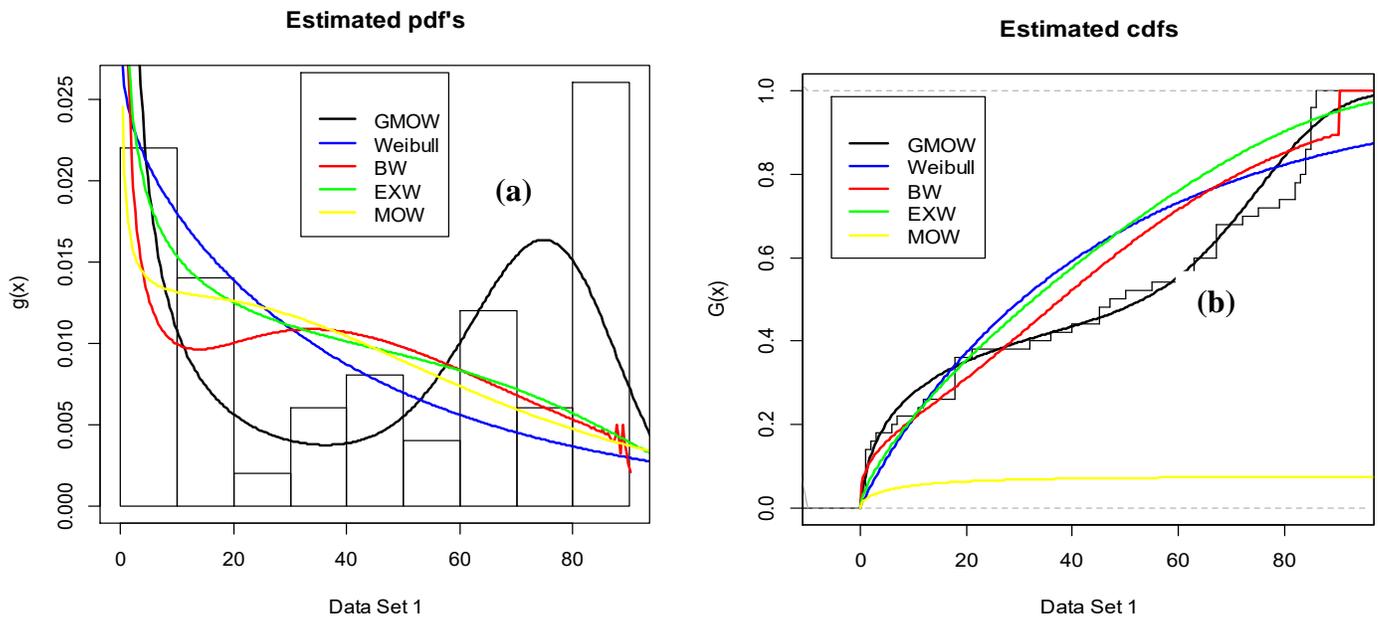


Figure 4. Estimated plots of Data set 1 a) competing pdfs b) competing cdfs with the empirical cdf.

The values in Tables 3 and 5 clearly indicate that GMOW distribution has the least goodness-of-fit statistics for the two data sets hence, provided the best fit among the competing distributions. The plots of the estimated pdfs and estimated cdfs of some the competing distributions are shown in Figures 4 and 5 for Data set 1 and Data set 2 respectively. The plots in the two Figures also show that the GMOW distribution provided the best fit for the data sets.

Table 4. Parameter estimate (standard errors) for Data set 2

Distribution	Parameter Estimate (Standard errors)				
$GMOW(p, \mu, \sigma, \lambda, \theta)$	0.0041 (0.0221)	1.4494 (8.3423)	9.4383 (6.2459)	3.6756 (2.7448)	63.5884 (31.750)
$BW(a, \beta, \lambda, \theta)$	0.7967 (0.4953)	0.0638 (0.0161)	0.8714 (0.0024)	2.5268 (0.0024)	
$GW(a, \lambda, \theta)$	0.9004 (1.9671)	0.9343 (1.5478)	63.4599 (173.246)		
$ExpW(a, \lambda, \theta)$	1.6149 (1.7986)	0.6012 (0.4083)	31.1669 (49.3803)		
$MOW(p, \lambda, \theta)$	3.7857 (7.8594)	0.6904 (0.3627)	24.1952 (41.5819)		
$KW(a, b, \lambda, \theta)$	0.7599 (0.0326)	0.0679 (0.0165)	0.9365 (0.0078)	3.6398 (0.0079)	
$Weibull(\lambda, \theta)$	0.8841 (0.1831)	59.1653 (16.936)			

Table 5. Goodness-of-fit statistics for Data set 2

Distribution	CvM	An	AIC	K-S
$GMOW(p, \mu, \sigma, \lambda, \theta)$	0.0235	0.1806	176.9677	0.1021
$BW(a, \beta, \lambda, \theta)$	0.0659	0.4791	181.2613	0.1515
$GW(a, \lambda, \theta)$	0.0678	0.4916	180.0657	0.1668
$ExpW(a, \lambda, \theta)$	0.0890	0.6165	181.5105	0.1698
$MOW(p, \lambda, \theta)$	0.3714	2.1015	179.8503	0.8697
$KW(a, b, \lambda, \theta)$	0.0647	0.4732	181.8574	0.1364
$Weibull(\lambda, \theta)$	0.0704	0.5076	178.2193	0.1491

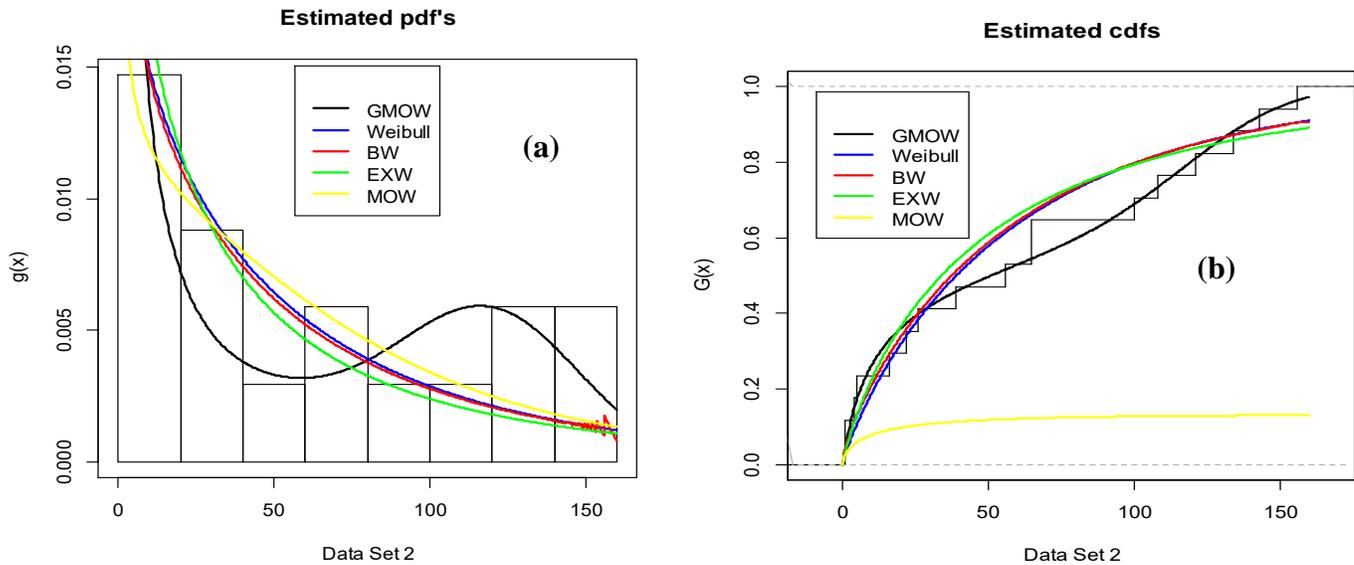


Figure 5. Estimated plots for Data set 2 a) competing pdfs b) competing cdf with the empirical cdf.

VIII. CONCLUSION

In this paper, we introduced a new flexible extended Weibull distribution called Gumbel Marshall-Olkin Weibull. The new distribution has bimodal pdf shape and bathtub hazard rate function shape among other shapes. The statistical properties of the new distribution were derived and the unknown parameters of the new distribution were estimated using the maximum likelihood method. Finally, the new distribution and other existing distributions in the literature were used to model two real-life data sets. The computed goodness-of-fit statistics show that the new distribution provided the best fit for the two data sets.

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Forecasting Stock Prices by Analyzing Announcements: The Case of Colombo Stock Exchange

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Abstract -Buying and selling shares has become one of the most popular and lucrative investment decisions for investors. Unlike before, today's stock price decision has become a more complex task. Profitability of the stock market investment depends on the investor's decisions and is based on a mix of dynamic environmental factors. Stock price trends are repeatedly forecasted to extract useful patterns and predict their movements. Moreover, the stock market forecast always has some appeal. There are different approaches to stock price prediction and different forecasting methods are used by stock market analysts. As a replica of many scientific endeavors, several methods have been found to accurately predict stock prices. Most researchers have been used technical analysis to get more accurate results, while limited researchers used fundamental analysis. From Sri Lanka's perspective, there is no evidence on predicting stock prices using machine learning. The main objective of this paper is to measure the effect of the announcement on the price of the stock and fill in the gaps in the literature. The population of the current study is all listed companies on the Colombo Stock Exchange. Among them, Ceylon Tobacco Company PLC, Dialog Axiata PLC, and John Keells Holdings PLC were selected as the sample for this study by employing simple random sampling method and market capitalization. The analysis was conducted by employing natural language processing mechanisms and Random Trees classifier presented the best results. The findings facilitate to predict the share price of the Colombo Stock Exchange using machine learning techniques. This model was able to predict the stock price with 65% accuracy and would benefit all individual investors in the local stock market.

Key Words- Colombo Stock Exchange, Fundamental Analysis, Machine Learning, Random Trees, Stock Price Prediction

I. INTRODUCTION

Many investors and brokers today use intelligent trading systems that help them predict stock prices based on various conditions, thereby helping them make direct investment decisions. An intelligent trader will predict the stock price and buy a stock before the price rises, or sell it before its value falls. Most investors have basic financial literacy but do not believe that they have sufficient basic knowledge about investing in the stock market [1]. Therefore, the conflict between knowledge and their trust leads them to misrepresent investments and rely on rumors about their investment decision. Lack of adequate knowledge of the capital market leads not only to loss but also to unattractive investment. Basic financial literacy is not an essential prerequisite for a good investment decision in the capital market, but it helps to make an investment decision and prevents a large loss [1].

The answer to this is the analysis of the financial statements. There are two types of stock analysis done by investors before investing in the stock; the first is the Fundamental Analysis, in this analysis investor's look at the intrinsic value of stocks, and performance of the industry, economy, political environment, etc. On the other hand, technical analysis is the analysis of stock prices by studying the statistics generated by past share prices and volume [2].

The Colombo Stock Exchange (CSE) is the leading stock exchange in Sri Lanka that offers investors buy and sell shares. It is one of the major exchanges providing an e-commerce platform in South Asia [2]. The official website of the Colombo Stock Exchange publishes announcements every day. They affect the share price of the company. This article analyzes the cse.lk announcement and predicts the impact on pricing. In recent years, the increasing importance of machine learning in various industries has enabled many vendors to apply machine-learning techniques in the field, some of which have yielded good results. Many researchers used technical analysis to learn machine learning. Limited researchers have conducted fundamental analyzes. There is a paucity of research on stock price forecasting using machine learning in the context of Sri Lanka.

II. LITERATURE REVIEW

The Colombo Stock Exchange is the backbone of the Sri Lankan economy. It was founded in 1896 under the Share Brokers Association (SBA). Establishing a Formal Stock Exchange with the merger of the Colombo Stock Exchange (CSE) in 1985, the stock market was taken over by the Colombo Share Brokers Association. It currently has a membership of 15 companies and is licensed to operate as stockbrokers. In 1990, the business was renamed the Colombo Stock Exchange. The CSE introduced the Central Depository System and the clearance was automated. The Colombo Stock Exchange headquarters was opened at WTC in 1995. The Milanka Price Index was introduced in 1999 and opened several branches in the country. Regional branches contain Kandy, Jaffna, Anuradhapura, Kurunegala, Matara, Ratnapura, and Ambalantota [3]. The Colombo Stock Exchange (CSE) has 289 companies representing 21 GICS industry groups as of January 20, 2020, with a market capitalization of Rs. 2,748.10 Bn.

During the '50s, the use of probability theory and statistics for asset pricing models began to be applied by financial economics. These developments led to the discovery of the Capital Asset Pricing Model (CAPM) [4][5]. Initially rejecting CAPM and other statistical approaches, the Efficient Market Hypothesis (EMH) [6] argues that stock price movements are a function of rational expectations based on publicly known information from companies, and these expectations are almost immediately reflected in stock prices, for example in the price history. This means that there is no justification for modeling stock price changes using the price history when these changes have already been accommodated to stock prices.

In response to EMH, Behavioral Economics (BE) theories [7] argue that markets are ineffective and that the element of random walking can actually be explained by human behavior. Like, they make irrational and systematic mistakes. For EMH and BE reconciliation, the adaptive market hypothesis (AMH) Andrew [8] states that traditional models can be correlated with behavioral models, which implies that market efficiency levels are associated with environmental factors. The adaptability of market competitors, size of available profit opportunities and market participants.

Stock market exchange news are special messages containing mainly economic and political information. Some of them carry information that is important for market forecasting. There is a variety of financial information sources available on electronic versions of their daily problems. All of these sources include global and regional political and economic news, quotes from influential bankers and political politicians, and recommendations from financial analysts.

Chan, Chui, & Kwok [9] confirm the response to news articles. They have shown that economic news always has a positive or negative impact on the number of shares traded. They used important political and economic news as a proxy for public information. They found that news affects both trading activity, including return volatility, price volatility, number of traded stocks and frequency. Yu [10] present a text-mining-based framework for determining the sentiment of news articles and their impact on energy demand. The news sentiment is presented quantitatively and in a time series, comparing energy demand and price fluctuations.

In their research, Nagar & Hahsler [11] proposed an automated text-based approach to gathering news from various sources and forming a news corporation. Corpus is filtered into relevant sentences and analyzed using natural language processing (NLP) techniques. News Sentiment, a psychometric metric that uses positive and negative polarity terms, is proposed as a measure of the overall news corporation's mood. This research paper Shynkevich [12] studies how the results of financial forecasting can be improved when multiple levels of relevant news articles are used simultaneously for the target stock. They used multi-kernel learning methods to segment information extracted from five different news categories based on sectors, sub-sectors, industries, and so on. The newsletters are divided into five sections related to the target segment, its sub-industry, industry, group industry, and sector, and use a separate kernel to analyze them. Experimental results show that the simultaneous use of five research groups improves predictive performance compared to methods based on low news categories. The findings show that trade-offs yielded the highest predictive accuracy and trade-off when the five news categories were used with two separate kernels of polynomial and Gaussian types used for each news category.

Machine learning methods for stock price predictions are becoming popular. Machine learning is the scientific study of algorithm and statistical models which use computer systems to perform a particular task. Without using specific instructions [13]. Through various experiments, it is possible to test machine learning techniques and select the most suitable one for predicting stock prices [14]. An increasing trend is machine learning and the use of artificial intelligence to predict stock prices [15]. More and more researchers are investing their time each day to come up with strategies that can improve the accuracy of the stock forecasting model. Stock market forecasting has long been an interesting topic for researchers in various fields. In particular, a variety of studies is conducted to predict the stock exchange movement using machine learning algorithms like support vector machines (SVM) and reinforcement learning [2].

Developed the WEKA (Waikato Environment for Knowledge Analysis) at the University of Waikato, New Zealand; Written in Java and distributed under the terms of the GNU General Public License [16].

WEKA is tried and tested using a graphical user interface, standard peripheral applications, or open-source machine learning software accessible through the Java API. It is mostly used for teaching, research, and industrial applications and has a wide range of tools for standard machine learning tasks. Famous toolboxes like Sci-kit-learn, R, and Deeplearning4j. [17].

Singhal & Jena (2013) have explained that the basic concept is used to analyze, categorize and ultimately summarize data from different angles. They introduce the core principle of data preprocessing, classification, clustering and the introduction of the WEKA tool. WEKA is a data-mining tool. How to use the WEKA tool for these technologies is outlined? It provides the ability to categorize data across different algorithms.

In the fundamental analysis, Joshi[19] used Naive Bayes, Random Forest, and SVM and Random Forest show ability to predict the stock price more accurately than the other functions. Kalmegh[16] used REPTree, Simple Cart and Random Tree Classifiers to analyze the data sets. As a result, it is found that Random Tree algorithm performs best in categorizing all the News.

III. Research Methodology

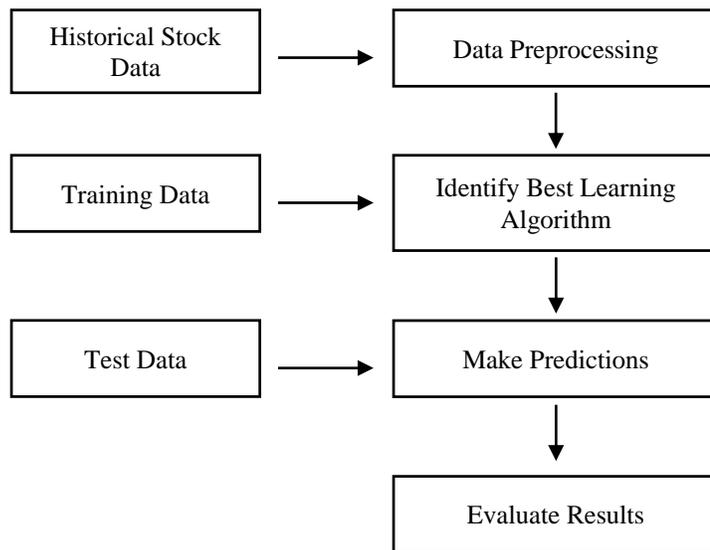


Figure 1: Framework

Step 01: Historical Stock Data

In this paper, only announcements published by the cse.lk website was considered. The total data for the past five years is collected.

Step 02: Data Preprocessing

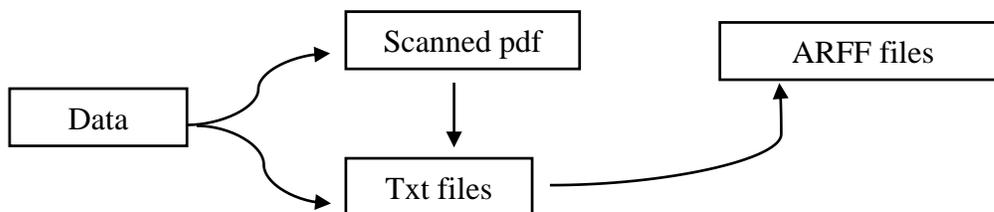


Figure 2: Data Preprocessing

Most of the data collected in cse.lk are scanned files and some are text files. Text files (.txt) can be directly converted to ARFF files. However, the scanned files (.pdf) cannot be converted to ARFF. Scanned files must first be converted to txt files and converted to ARFF files. PDF can be converted to TXT using “Onlineocr.net” website. After converting the txt files, they are divided into three parts: positive, negative, and not change. The researcher then created a training file using WEKA’s Simple CLI.

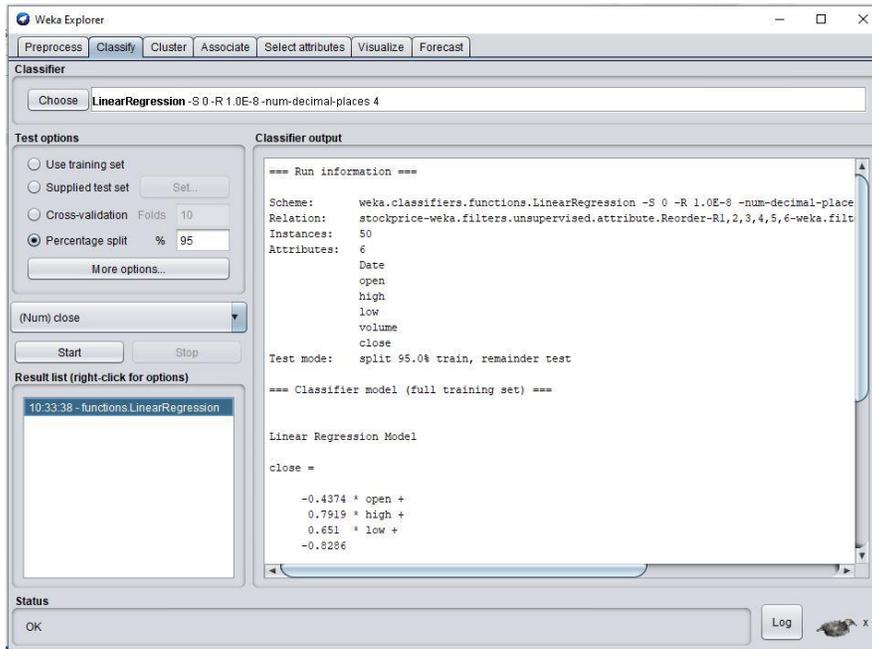
Step 03: Learning Algorithm (Learn Rules)

Classification is the process of finding a set of formats that describe and distinguish data classes and concepts so that the label can use the model to predict an unknown class. Classification is a two-step process; first, it creates a classification model using training data.

Each object in the dataset must be preprocessing beforehand, and its class label must be known; second, the model generated in the previous step is tested by assigning class labels to data objects in a test set.

This is about the first step, called training data. It is assumed that each tuple/sample belongs to a predefined class as determined by the class label attribute. In the fundamental analysis, the class attribute was the “Negative”, “Positive” or “Not Change”. The model is represented as a classification rule, decision trees, or mathematical formulas. For the training data, the researcher used a classify tab of WEKA as shown in figure 3.

Figure 3: WEKA Classify Tab



Step 04: Make Predictions

There are two steps to the classification process. The first is to build a classification model using training data. Second, the model generated in the previous step is tested using the test dataset. This step discusses how to predict values using the model. It assesses the accuracy of the model. The known label of the test sample is compared with the classification result of the model. Model construction describes a set of predefined classes. The accuracy ratio is the percentage of samples of test kits that are correctly classified by the model. The test set is independent of the training set, otherwise, excessive over-fitting will occur [18].

Step 5: Evaluate Results

The accuracy of the model can be estimated by comparing the actual results with the predicted results. Similarly, the Accuracy, Precision, Recall, F-Measure and ROC Area can be evaluated and select the most relevant classification.

IV. DATA ANALYSIS & PRESENTATION

A. Analysis of Data

For the analysis, the researcher collected data from the CSE's official website. They are textual data, which is an announcement of dividend payments, disclosures, changes to the Directory Board and the Employee Stock Option Schemes. The training dataset looks at the past five years and the test dataset looks at this year's announcements. Table 1 shows how to split the training and test dataset.

Table 1: Text Data Set

Company	Train	Test
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CTC	43	3
DIAL	71	7
JHK	90	7

The table 2 shows how the training dataset is contained.

Table 2: CTC Training Data Set

Company	Positive	Negative	Not Change	Total
CTC	17	12	14	43
DIAL	33	18	20	71
JKH	42	44	04	90

In the case of CTC, the total number of instances is 43, it contains 17 positive instances, 12 negative instances, and 14 not change instances. The 14 announcements do not affect the stock price. However, 29 announcements affect the company's share price. That is 67% of the total instances. This suggests that announcements can affect the share price. In terms of DIAL, the total number of cases is 71, which includes 33 positives, 18 negatives, and 20 not change cases. The 20 announcements do not affect the stock price. However, 51 announcements affect the company's share price. That is 72% of the total chances. In the case of JKH, there are 90 positive cases, 42 positive, 44 negatives, and four not change. Announcements 4 do not affect the stock price. However, 86 announcements affect the company's share price. That is 95.6% of the total chances. This shows that investors should be very careful about announcements when buying and selling JKH shares.

B. Analysis of Results

Before analyzing the data, it must choose a "Filtered Classifier". The researcher can then use any classification and the filter should be "StringToWordVector". The table 3 shows the accuracy of the model using 15-fold, 10-fold, 5-fold cross-validation, and the training set.

Table 3: CTC – J48

Measurement	15 - Folds	10 - Folds	5 - Folds	Use training set
Accuracy (%)	39.5	44.2	34.9	83.7
Precision	0.401	0.465	0.363	0.835
Recall	0.395	0.443	0.349	0.837
ROC	0.525	0.545	0.508	0.939
F - Measure	0.398	0.443	0.351	0.834
AUC	0.525	0.542	0.508	0.940

Use training set" shows higher accuracy. Therefore, the researcher used "use training set" to evaluate the classifiers. The researcher used five classifiers, which are past researchers used. It is as follows,

Table 4 Classifier Evaluation - CTC

Measurement	Naïve Bayes	SMO	J48	Random Forest	Random Tree
Accuracy (%)	90.7	100	83.72	100	100
Precision	0.919	1.000	0.835	1.000	1.000
Recall	0.907	1.000	0.837	1.000	1.000
ROC	0.975	1.000	0.939	1.000	1.000
F - Measure	0.902	1.000	0.834	1.000	1.000
AUC	0.975	1.000	0.940	1.000	1.000

MAE	0.0628	0.2222	0.1597	0.1524	0
RMSE	0.2464	0.2722	0.2826	0.1803	0
RAE (%)	14.27	50.48	36.28	34.62	0
RRSE (%)	52.55	58.03	60.25	38.45	0

When the look at the above tables all companies, and all classifiers shows good results. Its accuracy is more than 80% of all models. Similarly, SMO, Random Forest, and Random Tree classifiers show 100% accuracy and 1.0 Precision, Recall, ROC, AUC, and F-measure. The random tree shows the best results. Its accuracy is 100% and the error is zero. Therefore, this is the best classification for stock price prediction using text analysis. The literature says that the random tree classifier is the best classifier for stock price prediction using text analysis [16]. This research can further confirm that.

The tables below (Table 5, Table 6, and Table 7) show a comparison between the predicted results and the actual results. All predictions conducted using "Random Tree".

Table 5: Results Comparison - CTC

Instance	Predicted Results	Actual Results
1	Positive	Not Change
2	Positive	Positive
3	Positive	Negative

Table 6: Results Comparison - DIAL

Instance	Predicted Results	Actual Results
1	Positive	Not Change
2	Positive	Negative
3	Positive	Positive
4	Positive	Positive
5	Positive	Positive
6	Positive	Not Change
7	Not Change	Not Change

Table 7: Results Comparison - JKH

Instance	Predicted Results	Actual Results
1	Negative	Positive
2	Negative	Positive
3	Negative	Negative
4	Negative	Negative
5	Negative	Negative
6	Positive	Negative
7	Negative	Positive

V. CONCLUSION & RECOMMENDATIONS

In this analysis, its accuracy is more than 80% of all models. Similarly, SMO, Random Forest, and Random Tree classifiers show 100% accuracy and 1.0 Precision, Recall, ROC, and F-measure. The random tree shows the best results. Its accuracy is 100% and the error is zero. Therefore, this is the best classification for stock price prediction using text analysis. The literature says that the random tree classifier is the best classifier for stock price prediction using text analysis. Financial news affects the closing price of CTC 67%, Dial 72%, and JKH 95.6 percentage.

In this study, the researcher considers three different sectors in CSE. All sectors show the best classifier is the same one. However, other sectors may have different classifiers. Therefore, anyone interested in this field can do other areas to identify classifiers. In addition,

the researcher considers only the announcements posted on the CSE website. Newspaper articles, Twitter, FB posts, and financial reporting can also be considered in the fundamental analysis. Therefore, it might be more accurate. The most important thing for further research is to identify the value of fundamental analysis. That is to say how much the value of the shares will increase or decrease by the fundamental analysis.

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Developing a New Paper Structure For The G.C.E.(O/L) Mathematics Paper Using Graph Theory

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Abstract- This study focuses on developing a new paper structure for the G.C.E.(O/L) Mathematics paper using Graph Theoretical concepts. The graph theoretical model is built based on the competency levels of the O/L (Ordinary Level) Mathematics syllabi and their weights. Centrality measures such as Weighted Degree Centrality, Betweenness Centrality, Authority and Hub are used to analyze this model. The open source software Gephi is used to do the analysis. The new paper structure is designed based on the dominancy of each competency and the suggested weight of each Mathematical Theme.

Index Terms- G.C.E.(O/L) Mathematics, Graph theory, Centrality measures

1. INTRODUCTION

1.1 Background of Mathematics Education in Sri Lanka

The modern education system in Sri Lanka was introduced by the British in the 19th century. Since then, Mathematics has been taught in schools in different levels and in different modules by either making it compulsory or optional. But in 1972, Mathematics was made compulsory up to SSC (Secondary School Certificate) where nowadays call as G.C.E.(O/L). After several amendments in the curricula, in 2006, the Ministry of Education (MOE) in Sri Lanka introduced the Competency Based Curriculum incorporating the 5E learning cycle (5E- Engage, Explore, Explain, Elaborate and Evaluation). Parallel to the curriculum reformation, questions relating to real life scenarios were added to the O/L paper from 2008. Mathematics taught in junior secondary (year 6 to 9) has many applications in day to day activities. But most of the lessons covered in year 10 and 11 lay out a foundation for higher mathematics.

1.2 Current Stage of G.C.E.(O/L) Mathematics

According to statistics released by Department of Examinations (DOE) the failure rate from 2011 to 2015 was in between 40% to 45%. The pass rate has improved slightly after 2015, but still the failure rate is in between 30% to 40%. In 2017, 53.68% of students have scored less than 40 marks in the O/L examination. High failure rate in the G.C.E.(O/L) Mathematics is a huge problem that the educators and the authorities should look into. MOE has taken a number of steps to reduce the failure rate in O/L. Back in 1999, DOE has had two examination papers at two levels of difficulty. Then in 2001, Multiple Book Option (MBO) was introduced by MOE. Again in 2005, DOE conducted a mock examination for Mathematics. But all these initiatives did not last long. According to Mampitiya (2014) the O/L results can be improved by a properly designed examination paper.

2. METHODOLOGY

The current mathematics syllabus is built on 31 competencies. When generating the graph theoretical model, these competencies were taken as nodes and the links between each competency were represented by edges. These edges were given weights based on how much they are connected with each other. The dominancy of each competency in the directed weighted graph was analyzed using Gephi under the statistics; weighted degree, weighted in-degree, weighted out-degree, betweenness centrality, authority and hub. Points were given for each competency (node) according to their value of the statistic. Most dominant competencies were identified and percentage (suggested weight) of each mathematical theme was calculated based on Node Values. A new paper structure was designed based on the suggested weights.

3. RESULTS AND DISCUSSION

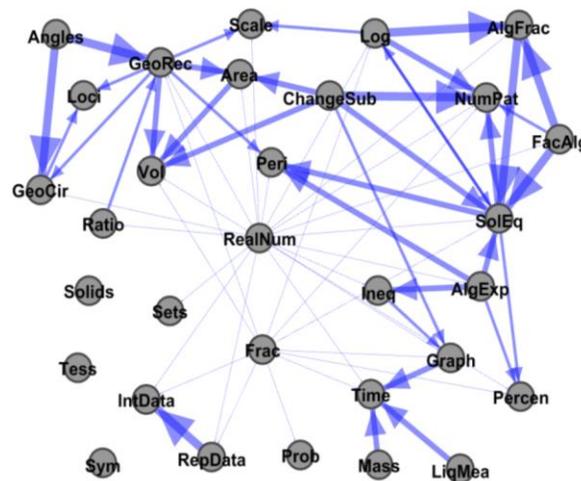


Figure 3.1: Graph Theoretical Model

Figure 3.1 is the graph obtained after considering competencies as nodes and the links between them as edges. It can be clearly seen that *Solids*, *Tessellation* and *Symmetry* have no link with the other nodes. These three topics are taught in year 6 to 8 and the content is not strong to be tested in the O/L exam. Therefore the above three nodes were removed from the further analysis.

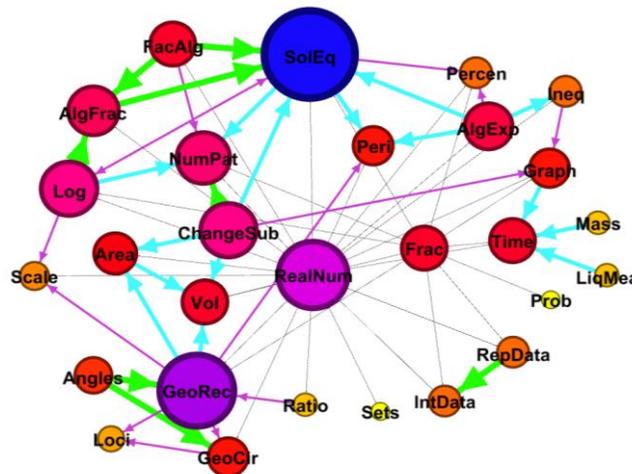


Figure 3.2: Ranking using Weighted Degree Centrality

According to the weighted degree centrality *Solving Equations* is the dominant node. *Geometry-Rectilinear* and *Real Numbers* are the next two important nodes. But on the other hand, *Sets* and *Probability* have only one link with the others. A node with high weighted degree indicates that the node is having a lot of links or strong links with the other nodes. Therefore, topics like *Solving Equations*, *Geometry-Rectilinear* and *Real Numbers* should be given more attention in teaching and learning process.

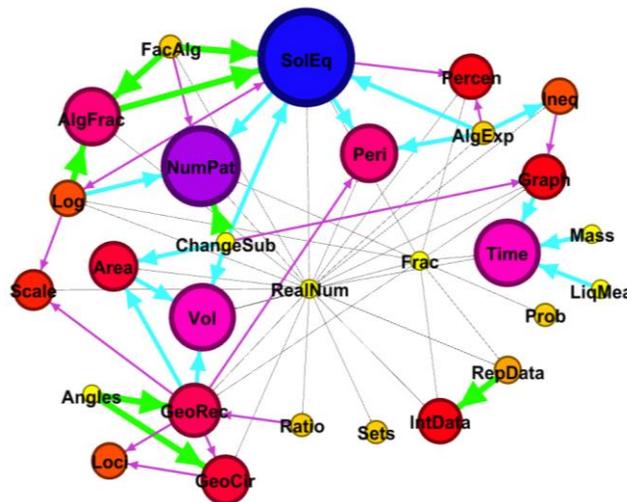


Figure 3.3: Ranking using Weighted In-degree Centrality

When the weighted in-degree is considered, *Solving Equations* has the highest in-degree centrality. *Number Patterns*, *Volume* and *Time* are some of the next few important nodes. Since no topics are applied in *Real Numbers*, *Fractions*, *Changing the Subject*, *Angles*, *Mass* and *Liquid Measures*, they have no weighted in-degree. The questions that are set on these six topics can be addressed using what is taught under that topic, because they have no incoming links. Questions on topics that are having high weighted in-degree might be difficult for the students as they need to be familiar with all the topics linked into those topics.

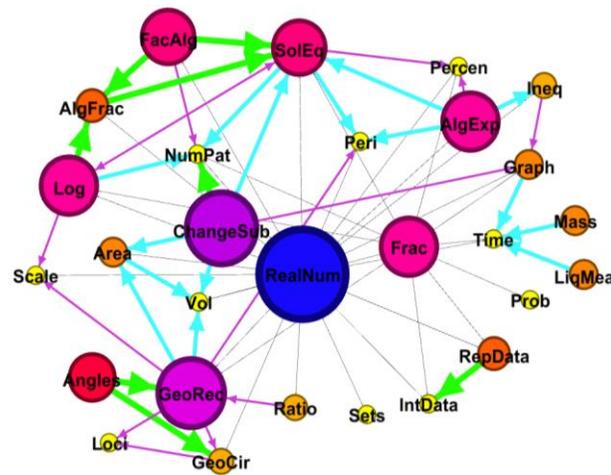


Figure 3.4: Ranking using Weighted Out-degree Centrality

The node *Real Numbers* is dominant when the weighted out-degree is considered. The next two important nodes are *Changing the Subject* and *Geometry Rectilinear*. It is possible to form individual questions on topics such as *Number Patterns*, *Volume*, *Time*, *Perimeter*, *Percentages*, *Interpretation of Data*, *Scale Diagrams* and *Loci Construction* because the weighted out-degrees of those nodes are zero. Studying thoroughly on topics having high weighted out-degree will be very much beneficial for the students as those are applied in many other topics linked.

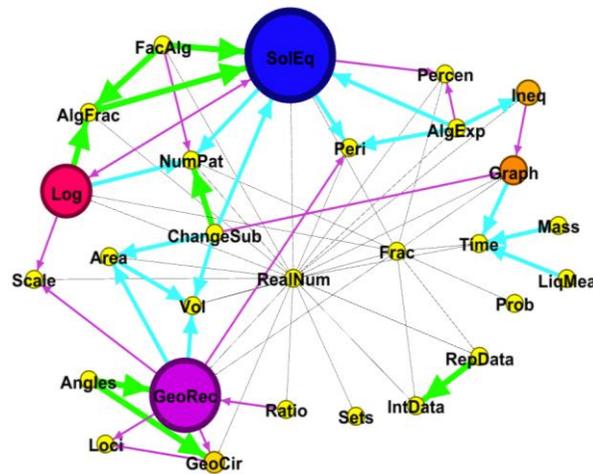


Figure 3.5: Ranking using Betweenness Centrality

There are few nodes acting as bridges in this model. Among those *Solving Equations* is the most dominant node. Nodes acting as bridges are important to merge topics when generating questions. The betweenness centrality of *Solving Equations* is very high compared to other nodes. Therefore, students should be familiar with the lessons that are covered around *Solving Equations*. When the three most dominant nodes are considered, it is noticeable that they belong to three different themes in the syllabus. *Solving Equations* belongs to Algebra, *Geometry_Rectilinear* belongs to Geometry and *Logarithm* belongs to Numbers.

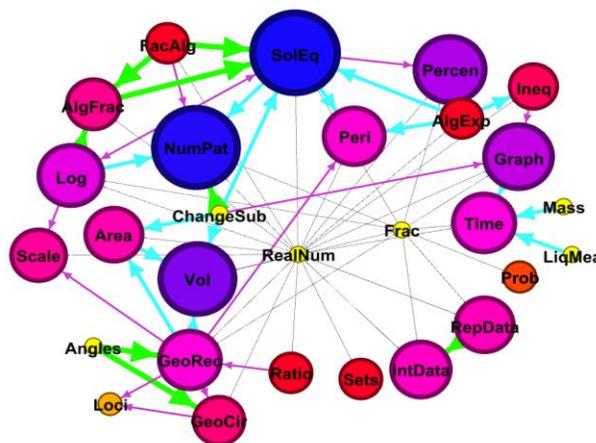


Figure 3.6: Ranking using Authority values

Nodes that contain useful information on a topic of interest are defined as authorities. But in this setting, a node having high authority value emphasize that, that particular topic uses the information of many more topics. *Solving Equations*, *Number Patterns* and *Volume* are the nodes that are having high authority values correspondingly. When the students study, they should practice more on topics having high authority values. The paper setters can select these high authoritative topics to test not only on the selected topic but the topics linked into those as well, rather than giving another question to test the linked topics. This can be used to reduce the number of questions in a test paper.

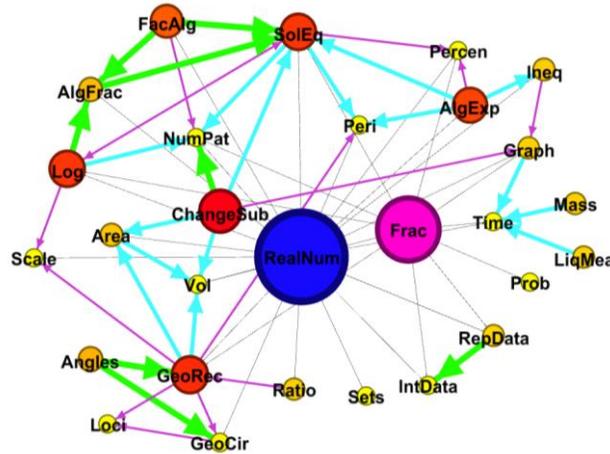


Figure 3.7: Ranking using Hub values

Hubs are nodes that tell where the best authorities can be found. The hub value of a node is high, if it is connected to a good authority. According to figure 3.7, *Real Numbers* and *Fractions* are the two main hubs. Their hub values are high, not only because they have lot of links but also because they are linked into good authorities such as *Solving Equations*, *Number Patterns* and *Volume*. After analyzing the graph based on the six statistics that were selected, nodes were given points according to their value of the statistic. After total points of each node was calculated, *Solving Equations* was identified as the most dominant node. *Geometry_ Rectilinear*, *Logarithms*, *Number Patterns* and *Real Numbers* lie next in the sequence. Students, teachers and paper setters can identify the above topics as most powerful areas in the syllabus. Questions in the O/L mathematics paper fall under six themes namely, *Numbers*, *Measurements*, *Algebra*, *Geometry*, *Statistics* and *Sets & probability*. Therefore the percentages of the six mathematical themes were calculated based on the total node values.

Table 3.1: Percentages of the mathematics themes

Theme	Node value Total	Percentage
Numbers	226	25.22321
Measurements	188	20.98214
Algebra	287	32.03125
Geometry	125	13.95089
Statistics	51	5.691964
Sets & Probability	19	2.120536

Since the percentages of the themes *Statistics* and *Sets & probability* are both less than 10%, the two themes were combined and called as *Statistics*.

Table 3.2: Comparison between the existing figures and the suggested figures

Theme	Percentage in the existing structure	Suggested Percentage
Numbers	22%	25%
Measurements	17%	21%
Algebra	19%	32%
Geometry	21%	14%
Statistics	21%	8%

According to table 3.2, the weight of *Algebra* should be increased up to 32% and it is a major change that should be done while making the exam paper. Also the weight of *Statistics* should not be more than 8% and weight of *Geometry* should be decreased by 7%.

Table 3.3: Existing Structure of the Mathematics paper

32 - Mathematics			
Paper I 2 hours 100 marks		Paper II 3 hours 100 marks	
Part A	Part B	Part A	Part B
25 short answer questions (25×2marks)	5 Structured questions (5×10marks)	6 Structured questions <i>Should select 5 to answer</i> (5×10marks)	6 Structured questions <i>Should select 5 to answer</i> (5×10marks)
Questions from the entire syllabus	<i>No questions on Algebra & Geometry</i>	<i>No questions on Geometry</i> 3 Questions on Algebra 3 Questions out of Numbers, Measurements, Statistics and Probability	<i>No questions on Algebra</i> 3 Questions on Geometry 3 Questions out of Numbers, Measurements, Statistics and Probability

The table 3.3 gives an overview of the existing structure of the mathematics paper.

Table 3.4: Compulsory subjects with their time duration

Compulsory Subject	Time Duration for both paper 1 & paper 2
Religion	3 hours
First Language *	3 hours
English	3 hours
Mathematics	5 hours
History	4 hours
Science	4 hours

*First language consists of a third paper which is a literature paper in which the duration is 2 hours.

According to the above table it is clear that students have to be occupied more on mathematics. This again shows that mathematics is given more weight amongst the other subjects. So at least time duration for mathematics should be reduced up to 4 hours for the weights of the subjects to be fairly distributed.

The proposed structure for the O/L mathematics paper is as follows.

Table 3.5: Suggested Paper Structure

Paper 1	Paper 2
100 marks	100 marks
2 hours	2 hours
50%	50%
Answer all questions	Answer all questions
Type of questions: <ul style="list-style-type: none"> • Short answer • Structured 	Type of questions: <ul style="list-style-type: none"> • Structured • Un-Structured
Level of Complexity of the questions: <ul style="list-style-type: none"> • Low • Moderate 	Level of Complexity of the questions: <ul style="list-style-type: none"> • Moderate • High
Distribution of Themes : <ul style="list-style-type: none"> • Numbers – 25 marks • Measurements – 21 marks • Algebra – 32 marks • Geometry – 14 marks • Statistics – 8 marks 	Distribution of Themes : <ul style="list-style-type: none"> • Numbers – 25 marks • Measurements – 21 marks • Algebra – 32 marks • Geometry – 14 marks • Statistics – 8 marks

Both Short answer questions (SAQ) and Structured questions (SQ) should be included in the first paper to maintain the standard of the paper, and in the second paper SQs and Unstructured questions (USQ) can be included, where USQs can be used to filter the best

students to do Advanced Level Mathematics. Also the paper setters should be given the freedom to decide the number of questions that can be put in the exam paper while maintaining the weights proposed in this article and maintaining the standard of the paper.

4. CONCLUSION

According to the centrality analysis *Solving Equations* is the most dominant competency. *Geometry_Rectilinear* and *Logarithms* are next in order. Students can use the graph theoretical model used for the analysis to see how the topics are connected, how important each topic is etc. and prepare themselves better for the exam. According to the analysis, more weight should be put on the theme *Algebra* and one fourth of the paper should be based on the theme *Numbers*. It was also suggested to combine the themes *Statistics* and *Sets & Probability*. The time duration of the mathematics paper was suggested to be reduced up to 4 hours.

In the proposed first paper, there should be short answer questions and structured questions with low and moderate complexity and structured and unstructured questions with moderate and high complexity in the second paper. But both the papers should carry questions on *Numbers* with 25 marks, *Measurements* with 21 marks, *Algebra* with 32 marks, *Geometry* with 14 marks and *Statistics* with 8 marks. It should also be compulsory to answer all the questions.

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Building Results-Based Monitoring & Evaluation Systems for Ailing Kenyan Organizations

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Abstract- Building a monitoring and evaluation system can be absolutely exhausting a task. Building a monitoring system to continuously track performance of government and or its institutions is essential for an assured success of such entities. The monitoring system gives a picture of the ongoing activities through select indicators on the direction of change, the pace of change, and the magnitude of change. Through this, it can also identify the unanticipated changes. All are critical to knowing whether policies, programs, and projects are moving in the intended direction and geared for the specific objectives.

Index Terms- monitoring, performance, indicators, change, policies, programs and projects, stalled, stopped, abandoned and projects.

I. INTRODUCTION

Results-based M&E has become a global phenomenon as national and international stakeholders in the development process have sought increased accountability, transparency, and results from governments and organizations. Multilateral development institutions, donor governments, parliaments, the private sector, NGOs, citizen's groups, and civil society are all voicing their interest in and concern for tangible results. Political and financial support for governments and their programs are becoming increasingly linked with government's ability to implement good policies, demonstrate effectiveness in the use of resources, and deliver real results.

The MDGs, the HIPC initiative, IDA funding, WTO membership, and EU accession are examples of just some of the international initiatives and forces for change in the direction of results-based M&E. Internally, Governments are facing the challenges of deregulation, commercialization, and privatization, as well as fluctuating budgets and resources.

For these reasons, governments and organizations are turning to results-based M&E in the hope that this public management tool can help them devise appropriate policies, manage financial and other resources, and fulfill their mandates and promises to internal and external stakeholders.

Results-based M&E moves beyond the traditional input-output –focused M&E, and, when used effectively, helps policy makers and decision makers focus on and analyze outcomes. After all, inputs and outputs tell little about the effectiveness of a given policy, program, or project. While traditional M&E remains an important part of the chain of results –based M&E, it is the

outcomes and impacts that are of most interest and import to governments and their stakeholders.

Building and sustaining results-based M&E systems is admittedly not an easy task. It requires continuous commitment, champions, time, effort, and resources. There may be many organizational and technical challenges to overcome in building these systems. Political challenges are usually the most difficult. And it may take several attempts before the system can be tailored to suit a given governmental or organizational policy, program or project. But it is doable. And it is certainly worthwhile in light of the increasingly common demands for and conditions attached to demonstrating good performance.

Good M&E systems also build knowledge capital by enabling governments and organizations to develop a knowledge base of the types of policies, programs, and projects that are successful –and more generally, what works, what does not, and why. Results-based M&E systems also help promote transparency and accountability, and may have beneficial spill-over effects in other parts of a government or organization. In short, there is tremendous power in measuring performance.

Many of the OECD countries have had 20 or more years of experience in M&E, and are at varying stages of progress with regard to results-based M&E systems. The OECD countries –like their developing country counterparts–created evaluation cultures and M&E systems in response to varying degrees of internal and external pressures. Furthermore, developed countries have chosen a variety of starting points for implementing results-based M&E systems, including whole-of-government, enclave, and mixed approaches.

Recent OECD survey results found that most of the OECD member countries now include performance information in their budgets. With respect to results considerations, about half of the countries have taken into account the distinction between outputs and outcomes. Much remains to be done though, such as linking performance targets to expenditures, and using performance information to determine budgetary allocations. Thus, many OECD countries, results –based M&E is still a work in progress. The lessons learnt from the OECD countries' experience are useful and applicable to developing countries as they now face the challenges of creating their own M&E systems and cultures. OECD countries with democratic political systems, strong empirical traditions, civil servants trained in social sciences, and high levels of expenditure on education, health, and social welfare have been among the most successful in adapting results-based M&E systems. Infact, building such systems is first

and foremost a political activity with technical dimensions rather than vice versa. The OECD experience demonstrates that creating results-based M&E systems requires continuous effort to achieve comprehensive coverage across governmental management and budgetary systems.

Developing countries face a variety of unique challenges as they try to answer the “so what” question: What are the results and the impacts of government actions and interventions? These countries may encounter such obstacles as lack of demand for and ownership of M&E systems, weak institutional capacity, lack of bureaucratic cooperation and coordination, lack of highly placed champions, weak or nonexistent legal and regulatory frameworks, a traditional M&E culture, lack of workforce capacity, political and administrative cultures and conducive to M&E implementation, and so forth. Despite these obstacles, many developing countries have made impressive progress in developing results-based M&E systems. The challenges are difficult, but good governance is essential for achieving economic, social and human development. Developing countries deserve good governance no less than others.

Finally, given the increasing number of internal and external partnerships that are being formed to accomplish development goals, a new need has emerged for M&E systems that

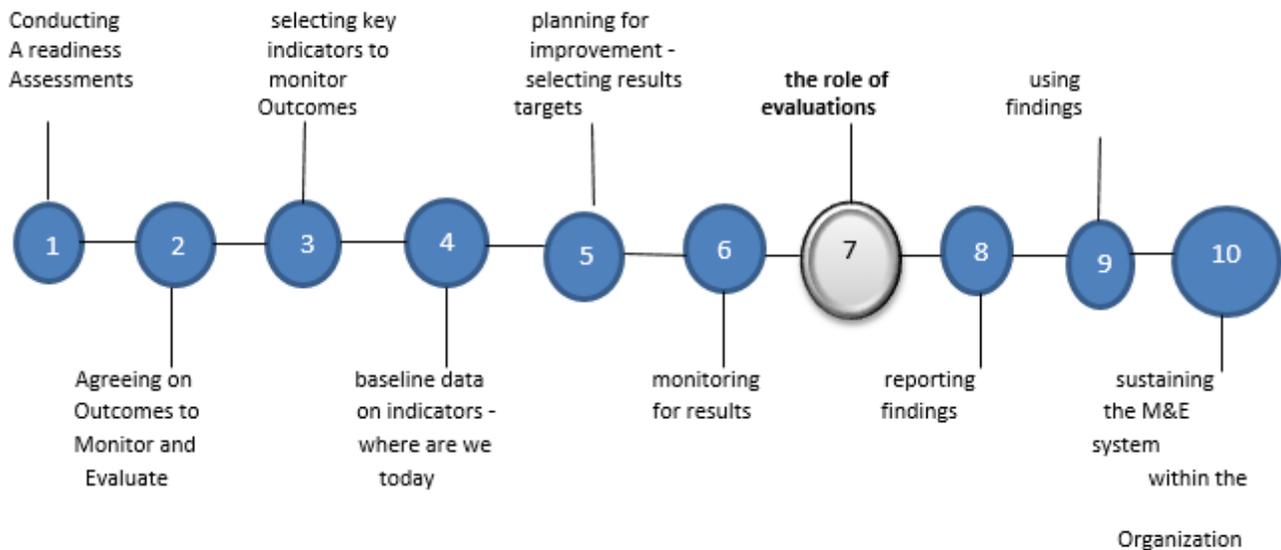
encompasses these broader partnership efforts. International coordination of results is the next stage in evolutionary process of extending results-based M&E.

II. ORGANIZATION OF THE STUDY.

This study is organized under the following sub-headings: abstract introduction, the theoretical model, ten steps for building a results-based M&E system, sad experience and example from the Uhuru administration, conclusion and References.

III. HOW TO CREATE RESULTS-BASED M&E SYSTEMS.

There are ten steps here that can help governments and organizations create, develop and sustain results –based M&E systems. This model may be used for policies, programs, and projects. Though visually it appears as a linear process, in reality it is not. One will inevitably move back and forth along steps, or work on several steps simultaneously. See Figure 1 below.



Source: Research literature 2020.

The model has some unique features, including step 1, conducting a readiness assessment. This assessment, often missed or omitted, is a diagnostic tool that determines whether governments are actually ready and able to move forward in building, using, and sustaining M&E systems. The three main parts of the readiness assessment include an examination of incentives or demands for designing and building a results-based M&E system, roles, and responsibilities and existing structures for assessing performance of government, and capacity building

requirements. More specifically, the readiness assessment looks at eight key areas, including the following: what or who is encouraging the need for M&E systems; motivations of champions; ownership and beneficiaries of systems; how the system will support better resource allocation and achievement of goals; dealing with negative or detrimental information generated by M&E; existing capacity to support M&E systems; and links between the M&E system and project, program, sector, and national goals.

A variety of lessons learned have been generated by readiness assessment conducted in developing countries. For example, Bangladesh had few of the necessary requirements to begin building M&E systems. Assessment in Egypt and Romania, however, yielded vital information about likely entry points for beginning work on M&E. Highly placed political champions and strong, sustained political leadership were found to be key ingredients in the M&E mix. Other findings are that ministries may be at different stages in the ability to conduct M&E. It may be possible to move forward with M&E by working with pockets of innovation within government. Communication and coordination within and between government agencies and departments and among donors are also important. Developing countries may currently lack the institutional, human, and technical capacity to design, implement, and use results-based M&E systems; however, this is not an instrumentable obstacle. Training and technical assistance can be provided to remedy these difficulties. But no amount of training and technical assistance can substitute for indigenous political will. Often, the political challenges are more difficult to overcome than the technical ones. Choosing outcomes to monitor and evaluate is the second step. All governments must set goals, regardless of whether they have the capacity to conduct M&E. Outcomes will show which road to take. Building the M&E system is essentially a deductive process in which inputs, activities, outputs, and outcomes are all derived from the setting of longer term strategic goals. Likewise, setting outcomes is the first building block for developing a performance framework. Indicators, baselines, and targets will all flow from the outcomes.

Building M&E systems is a participatory political process, and key internal and external stakeholders should be consulted during the various steps of the model including the readiness assessment, the setting of outcomes, establishment of indicators, and so on. Critical stakeholders and their main concerns will need to be identified. Existing problems need to be reformulated into a set of positive outcomes. Outcome statements need disaggregation, and each statement should contain only one goal. (This becomes important when developing indicators and targets). Agreeing on strategic priorities and outcomes will then help drive resource allocation.

Key performance indicators (step 3) can only be set after agreeing upon and setting goals. As with the case of outcomes, the interests of selecting indicators. Indicators are the quantitative or qualitative variables that provide a simple and reliable means to measure achievement of goals. As stressed throughout the model, indicators should be developed for all levels of the results-based M&E system, meaning that indicators will be needed to monitor progress with respect to inputs, activities, outputs, outcomes, and impacts continually. Progress needs to be monitored at all levels of the system to provide feedback on areas of success, as well as areas where improvements may be needed.

Good performance indicators should be clear, relevant, economic, adequate, and monitorable (CREAM). Every indicator also needs its own separate M&E system, so caution should be exercised in setting too many indicators. Proxy and predesigned indicators may be adopted with full recognition of the pros and cons of using them. Constructing good indicators often takes more than one to try; arriving at the final set of indicators will take time. Piloting of

indicators is essential. Indicators should be well thought through. And they should not be changed very often - this can lead to chaos in the overall data collection system. It should also be remembered that performance indicators can be used to provide feedback, and can provide a wealth of performance information. Many developing countries are making progress in the performance indicator selection process.

Baselines, step 4, are derived from outcomes and indicators. A performance baseline is basically information quantitative or qualitative - that provides data at the beginning of, or just prior to, the monitoring period. It is used as a starting point from which to monitor future performance. Or, stated somewhat differently, baselines are the first measurements of indicators. The challenge is to obtain adequate baseline information on each of the performance indicators for each outcome.

Eight key questions are outlined for with respect to building baseline information: sources of data, data collection methods, which collects data, how often data are collected, cost and difficulty to collect data, who analyses data, who reports data, and who uses data. Sources are who or what provides data. Not the method of collecting data. Data sources may be primary or secondary.

There are a variety of data collecting methods along the continuum from informal and less structured to more structured and formal methods. Data collection methods include conversation with concerned individuals, community interviews, reviews of official records, key informant interviews and participant observation, focus group interviews, direct observations, questionnaires, one time surveys, panel surveys, census, and field experiments. Data collection strategies necessarily involve some tradeoffs with respect to cost, precision, credibility and timelines.

Establishing baseline data on indicators is crucial in determining current conditions and in measuring future performance. Subsequent measurements from the baseline will provide important directional or trend data, and can help decision makers determine whether they are on track with respect to their goals.

Selecting results targets step 5. Targets are the interim steps on the way to longer-term outcome. Again a deductive reasoning process is involved, in which targets are based on outcomes; indicators and baselines. Selecting targets should also entail consultative, political, participatory process with key stakeholders. Targets can be determined by adding desired levels of improvements to baseline indicator levels (assuming a finite and expected level of inputs and activities). Targets should be feasible given all of the resources (inputs) considerations. Each indicator is expected to have only one target over a specified time frame.

Target setting is the final step in building the performance framework. The performance framework in turn becomes the basis for planning with attendant implications for budgeting, resource allocation, staffing, and so forth. Performance frameworks have broad applicability and can be usefully employed as a format for National Poverty, Reduction Strategies, Project plans, Programs, and Policies.

Monitoring for results, step 6, entails both implementation monitoring (means and strategies) and results monitoring. The key principles of building a monitoring system include recognizing the

performance information needs at the policy, program, and project levels; the need for performance information to move both the horizontally and vertically in the organization; identifying the demand for performance information at each level; and identifying the responsibilities at each level.

The major criteria for collecting quality performance data are the reliability, validity, and timeliness of the data. Every monitoring system needs ownership, management, maintenance and credibility. Monitoring for results also calls for data collection and analysis of performance data. These are to be expected, so it is important to pretest data collection instruments and procedures.

Building the monitoring system framework means that each outcome will require an indicator, baseline, target, data collection strategy, data analysis, reporting plan, and identified users.

Achieving results through partnership is essential. Means and strategies will need to be set by multiple partners. One must look beyond one's own organizational unit when considering available inputs. Partnerships may be created elsewhere in one's own organization, or even with other organizations inside or outside of government.

Step 7, involves using evaluation information to support a results-based M&E system. Monitoring and evaluation are complementary, and both are needed in these systems. Evaluation information can be used for a variety of purposes: making resource allocation decisions, rethinking causality of problems; decision making in selecting among competing alternatives; supporting public sector reform; and so on. Evaluation information can also be relevant at all phases of a given policy, program, or project cycle.

The timing of evaluation is another consideration. Evaluative information is essential when: (a) regular measurements of key indicators suggest a sharp divergence between planned and actual performance; (b) performance indicators consistently suggest weak or no results from an initiative; (c) resource allocations are being made across policies, programs, or projects; and (d) similar projects, programs, or policies report divergent evidence of outcomes.

There are seven different types of evaluation: performance logic chain, reimplementation assessment, rapid appraisal, case study, meta-evaluation, impact evaluation, and process implementation. Each is appropriate to specific kinds of evaluation questions. Quality evaluations can be characterized by impartiality, usefulness stakeholder involvement, and value for money, feedback and dissemination and technical adequacy.

Reporting findings step 8, is a critical step in the process. Continuous performance data and findings should be used to help improve policies, programs, and projects. In analyzing and reporting data, the more data measurements there are, and the more certain one can be of trends, directions, and results. There is an implicit tradeoff between measurement frequency and measurement precision. Cost and capacity also come into play.

Performance data should be reported in comparison to earlier data and to the baseline. Also, to measure and compare against expected results, one must be able to compare present and past circumstances. Monitoring data are not causality data. They do not tell why an event occurred. It is also important to take into account the target audience when reporting findings.

Using findings, step 9, will better inform the decision-making process. There is wide range of uses of performance findings. For

example, performance-based budgets budget to outputs, but also help decision makers manage outcomes. Another noteworthy phenomenon is that if performance information is asked for, improved performance will occur. Using continuous findings can also help to generate knowledge and learning within governments and organizations. Building a credible knowledge management system is another key component of using findings.

There are a variety of strategies that can be used to share information. A good communication strategy is essential for disseminating and sharing information with key stakeholders. Sharing information with stakeholders helps to bring them into business of government and can help to generate trust. This is, after all, one of the purposes of building results-based M&E system.

Finally, step 10 deals with sustaining the M&E system. We suggested there are six critical components to doing so: demand, clear roles, and responsibilities, incentives, trustworthy and credible information, accountability, and capacity. We also examined the incentives and disincentives that may come into play in sustaining M&E systems. And we also know that problems will occur in implementing and sustaining the systems.

Sad experiences of the Uhuru administration of lack of feasibility studies, monitoring & evaluation for projects - Kenya:

The Standard Newspaper dated 21st July 2020 attests to the sad example that shows how the Kenyan government mounts projects without conducting a feasibility study, or does any monitoring and evaluation exercise to ascertain the viability of proposed projects and can run up to completion for the country to be able to reap fruits. **"The Standard Newspaper above had the hard title: Legal tussles haunt President Uhuru's multi-billion legacy projects"**.

An analysis of court cases shows that almost all mega plans have either stalled, intend to be stopped or have failed to take off even after implementation, says part of the paper. The fight over the projects through court cases demonstrate the vicious wars between the government, individuals, activists and NGOs that have put president Kenyatta's legacy at stake, says another part of the paper.

"An analysis of court cases shows that almost all the major projects the president has championed have battles in court, some have stalled, others intend to be stopped and others have had their implementation halted", says the paper in part.

President Uhuru has often accused the judiciary of frustrating his projects, with the relationship between himself and the chief justice David Maraga deteriorating after the Head of State refused to appoint the 41 new judges says another part of the paper.

"There are several issues surrounding these projects. Some may be environmental and they (courts) may resolve the issues but, there is some harm they are likely to cause. In such a case, if the government does not lose the money invested in the project, it has to pay delay costs.

Activist Okiya Omutatah says, "the jubilee government is to blame for stalled projects by failing to follow procurement procedures. He, Omutatah defends the judiciary by saying that the government has thrown the law through the window, rendering procurement and appointment processes a breeding ground for graft.

He cites the Standard Gauge Railway as one of the projects that was never budgeted for. He; Omutatah told the Standard Newspaper that the Jubilee government thinks that the law is an impediment and that you would rather rule through fiat than the law. He concludes by saying that the projects have been marred by corruption. Says the paper in part.

IV. CONCLUSION

Results-based M&E systems are a powerful public management tool that can be used by governments and organizations to demonstrate accountability, transparency and results oriented projects. They can help to build and foster political and financial support and harmony for common policies, programs, and projects. And they can help the government build a solid knowledge base.

Importantly, results-based M&E systems can also bring about major political and cultural changes in the way the governments and organizations operate-leading to improved performance, enhanced accountability and transparency, learning and knowledge.

Results-based M&E systems should be considered a work in progress. Continuous attention, resources, and political commitment are needed to ensure the viability and sustainability of these systems. Building the cultural shift necessary to move an organization towards a results orientation takes time, commitment, and political will. In the absence of the efforts to undertake this transformation, the only way an organization can cost is downhill. Building and sustaining a results-based M&E system takes time and effort. But it is also noteworthy to remember that no system is perfect, and there are many different approaches, but the journey is worth the energy and effort and the rewards can be many especially, to Kenya under the prevailing environmental conditions where there are numerous legal tussles, Lack of rule of law and a pronounced ground for graft.

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Strategies to improve medicinal drug availability at Health Care Institutions

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Abstract- Drugs are essential component for running the health care institutions. The management of drug supply includes five basic functions of the Medicines Management cycle namely, selection, quantification, procurement, distribution, and use. Management support system for medicine management cycle includes organization, financing and sustainability, information management, human resource and quality assurance management. The success of medicines management cycle will depend upon the ability to reliably consistently and continuously supply standard quality medicines at affordable rates to health facilities at all levels of the healthcare system. Good medicinal drugs Supply Chain Management (SCM) helps to medicine management cycle and thereby improves availability of medical drugs and devices at health care institutions. This qualitative study was conducted with the objective of strategies to improve drug availability at Health Care Institutions. The study showed that, selection and quantification is done by the annual estimation of drugs at the health care institution level and the MSD level. Procuring agent to the MSD is SPC and it delivers medicinal drugs with adequate quantity with right quality at a right time to MSD. Store facilities and distribution was satisfactory and it is in the process of improving the capacity and the drug usage was properly done at institutional level. Therefore, this study showed that the basic function of medicinal management cycle is achieved. According to this study it was recommended a country should have a sound drug supply chain management system to improve the medicinal drugs availability at institutional level and also further recommended to conduct a quantitative study on drugs availability and factors affecting.

Index Terms- Health Care Institution, Drug Availability and Supply Chain Management

I. INTRODUCTION

Drugs are essential component for running the health care institutes at National and Provincial level in a country. The management of drug supply includes five basic functions of the Medicines Management cycle namely, selection, quantification, procurement, distribution, and use. Management support system for medicine management cycle includes organization, financing and sustainability, information management, human resource and quality assurance management. The success of medicines management cycle will depend upon the ability to reliably and consistently supply the standard quality medicines at affordable

rates to health facilities at all levels of the healthcare system [1]. A good Supply Chain Management (SCM) in medicinal drugs helps to improve availability of medical drugs and devices at health care institution. Supply Chain Management (SCM) is a process which creates a product or a service from raw materials to final product that is consumed by the consumer. In this process the product, information and the finance flow occurs both in forward and backward directions and also to satisfy end consumer requisites with goods and services from diverse, connected suppliers [2, 3]. To provide quality health care services Medical products and Drugs are essential, and should be available at right place, at right time, with right quality, and right quantity, at a right cost, in the health care institutions and this can be achieved by a good SCM.

In Sri Lanka the line ministry and provincial ministry health care institutions receive drugs through Medical Supply Division (MSD) and Regional Medical Supply Division (RMSD). The MSD of Ministry of Health and Indigenous Medical Services, is the main organization responsible for providing all Pharmaceuticals, Surgical items, Laboratory Items, Radioactive Items, Printed materials, etc. for Government sector healthcare institutions throughout the country [4]. It has a network of stores comprising of with a central Medical Stores in Colombo (MSD) and there are 26 Regional stores at district level (RMSD). In the chain of central medical stores there are 18 Bulk warehouses at main building, 3 Bulk warehouses at Angoda, 5 bulk warehouses at Wellawatta, one warehouse at Digana and one warehouse at Welisara [5]. There is a good supply chain to maintain the uninterrupted availability of the drugs at institutional level [6]. The annual budget of the MSD is 38 Billion Sri Lankan Rupees and the State Pharmaceutical Corporation (SPC) – a government owned corporation is the procurement entity on behalf of MSD [5].

II. METHODOLOGY

The objective of the study was strategies to improve drug availability at Health Care Institutions. This study was a qualitative study. Qualitative data was gathered on medical and medical devices supply chain management in the public health care sectors. The data was collected by Key Informant Interviews, Focus Group Discussion, observation and review of relevant websites and also by desk reviews.

III. RESULTS

The central procuring agent was the State Pharmaceutical Company. The flow of the product (medicinal drugs) is as follows. Once the medicinal drugs are procured by the SPC the procured items are handed over to the MSD. In Sri Lanka, health system is divided to line ministry institution and provincial ministry institutions as mention in the introduction. The items are distributed to the line ministry health care institution via MSD directly, whereas to provincial ministry institutions it through the Regional Medical Supply Division (RMSD) and RMSD receives the items directly from the MSD. Strategy used by the MSD was to maintain good SCM. Therefore the product flow (medicinal drugs) starts from the SPC and received by the MSD. By SPC the products are timely supplied without interruption and maintained the continuous supply. This continuous supply of items from the SPC resulted, improvement of drugs availability at the health care institutions.

Once the medicinal drugs are received next was storing the drugs. The central medical store of MSD had 18 Bulk warehouses at main building, 10 Bulk warehouses at separate locations. At regional level there were 26 RMSD with stores. All these warehouses and stores were able store buffer stock of medicinal drugs for adequate period. Further, these stores are upgrading to store buffer stocks for more duration than the current capacity. In addition, the health care institutions also comprise of drugs stores to store these medicinal drugs and these stores are also in the process of upgrading the capacity. All these stores and warehouses maintained at a recommended temperature and also had cold rooms. This insured the cold chain maintenance and the quality of the medicinal drugs. The quality was checked at various levels and this practice helped to maintain the standard and quality of the drugs. At the procurement stage the quality certificates, approvals from recognized organizations and good manufacturing practices were checked. Drugs are checked for quality once it is received at the MSD level. Every drug reaction and quality is checked regularly at the institutional level and takes necessary actions to prevent these incidences. The Medical Supply Management Information System helps in this process; further this system will alert and stop using the particular drug.

MSD had a good vehicle fleet to provide timely transportation all over the country. The vehicles were built with temperature control systems to maintain the cold chain and to maintain recommended temperature for the medicinal drugs. This ensures the maintenance of quality of the medicinal drugs. This transportation system helped to maintain the continuous supply and improve the medicinal drugs availability.

The main contributor to Supply Chain Management was the Medical Supply Management Information System (MSMIS). This software link all the RMSD, line ministry health care institutions and line ministry and provincial ministry secondary care health care institutions with the MSD. Establishing this MSMIS system with the remaining health care institutions (primary health care institutions) are in the process. This software helps in stock control activities. It also includes, ordering facility, medicinal drugs transfer to other health care institutions and also managing the quality failure drugs. This system helps for annual estimation of medicinal drugs. SCM is maintained with the help of this system and helps to improve the drugs availability at health care institutions.

In addition to the data from the MSMIS system, all healthcare institution performs annual estimation manually and submits to the MSD. MSD compile these estimates and order is given to the SPC. This ensures the adequate number of drugs to the health care institution for the particular year. Drugs and therapeutic committee meetings are conducted regularly at health care institutions and feedback is given to MSD to improve the supply.

At the institutional level pharmacists and dispensers are employed in indoor and outdoor pharmacy for proper distribution to patients and management of drugs. The rational usage of drugs is practiced by the doctors. This prevents unnecessary prescription.

On this study it was found that few items were delayed to supply to MSD due to supplier delay. But this was overcome by storing adequate buffer stocks.

IV. CONCLUSION

Basic functions of the medicines management cycle are selection, quantification, procurement, distribution, and use. MSD main responsibilities are to supply drugs and medical products at the right time, with right quality and right quantity to right place, by a good SCM which helps to increase the drug availability at institution level. The selection and quantification is done by the annual estimation of drugs at the health care institution level and the MSD level. Procuring agent to the MSD is SPC and it delivers medicinal drugs with adequate quantity with right quality at a right time. Store facilities and distribution was satisfactory and usage is properly done at institutional level. Therefore, this study shows that the basic function of medicinal management cycle is achieved.

V. RECOMMENDATION

1. A country should have a sound drug supply chain management system.
2. Since this is a qualitative study it is recommended to conduct a quantitative study on drugs availability and factors affecting

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Stress of Employees Working in the Aviation Industry: A Study of Bangkok Airways Limited Ground Service Agents

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Abstract- This study examined the relationship between sources of stress at work and Ground service agents' level of stress. Of the 150 Thai full-time Ground service agents based at Bangkok station who received the survey, 114 returned it for a 76% response rate. Stepwise regression analysis was used to determine the impact of Five Sources of Stress at work on the level of employees' stress level. The findings revealed that all aspects of five stress sources' dimensions including Job Characteristics; Role of employee participation; Progression of careers; Relationship in the workplace; Organizational structure and climate were positively correlated with the level of stress among Ground service agents. In the regression analysis, it was found that Role of employee participation and Relationship in the workplace were the factors that most significantly affected stress level at work. The influence of working factors on employees' stress level who work in aviation industry was discussed in light of these findings.

Index Terms- Stress at work, Aviation, Ground Service Agents, Thailand

I. INTRODUCTION

Aviation is a popular blueprint of contemporary tourism. Customer services are an integral part of the aviation industry for its efficiency. Aviation customer services functions as cabin crew, check-in traveler, provide support for people at the VIP lounge, help people in need of ticket information at the counters, they manage the flight control center, they are in charge of luggage and load control and many more (Duliba, Kauffman & Lucas, 2001). Aviation customer service employees work mainly at airports and airfields. Several studies show there is a linkage between the increase of stress and customer service employees in the aviation industry. The increase in stress levels among the crews has resulted in high staff turnover, poor performance on the job, and unsafe job practice (Peksatici, 2018). However, the level of detail that reveals why there is an increased level of stress among aviation customer services employees is not specific enough and should be the subject of future research

To bridge the gap and lapse of past research, the relationship or mediators that influenced occupational stress and work performance must be discussed (Jennifer, 2005). A quantitative review of twenty-eight thousand employees in two-hundred and fifteen different organizations in the U.S revealed

that stress at work could cause poor performance at work, it can also cause vital health issues and staff burnout (Akgemci, Demirsel & Kara, 2013). For this study, individuals considered as 'Ground Service Agent' are employees that work in the following units, reservation department, passenger service department, ticket service department, and customer service department. in. Individuals in all of the departments and units mentioned above play an essential role in effective running air transportation. The work pressure of these individuals poses a threat to their health, aviation safety, and company's efficiency. Several pieces of evidence show that the working environment of some professionals put their health at risk as a result of workplace stress and imbalance work-life.

The working conditions of Ground Service Agent covers the range of services and interactions from passenger involving with checking in at the airport to competing boarding (Yang & Tseng, 2010). They need to be aware of the safety or health hazard or risk to passengers as well as deal with unruly behaviours of passengers (Malaysia Airlines, 2009; Cathay Pacific Airways, 2010; China Airlines, 2010). Therefore, such working conditions may cause stress among the employees, which affects employee's health, reduce efficiency and safety of aviation and organizational performance (David, 2010). Cooper and Marshall's (1976) original model of work related stress included five sources of stress at work. These sources include (1) Intrinsic to the job; (2) role in the organisation; (3) career development; (4) relationships at work; and (5) organisational structure and climate.

The first purpose of the paper was to study the relationship between the five-source of stress at work and the level of the stress among Ground Service Agent. The second purpose was to further analyse the effect of the five-source of stress on the level of stress among employees.

II. LITERATURE REVIEW

The following section describes theoretical foundations in relation to stress for this study.

2.1 The Sources of Stress

Stress is the perception of pressure on an individual, but stress is never the source of demand for pressure. The brief summation of stress is derived from prior research conducted on stress. The cause of stress in the aviation industry can be categorized into physical and environmental stress (Tourigny, Baba & Wang, 2010). Physical stressors are internal conditions

or factors that affect people, while environmental stressors are external factors that affect people or cause stress. Internal factor has an effect on the body in the form of pains, sleeplessness, hunger, etc. while external factors are environmental factors that affect individuals such as heat, pollution, noise, overcrowding. The familiar environmental and physical stressors cabin crews are usually exposed to are warning horns, continuous radio communication noise, irregular temperature, vibration noise from engines, limited workspace, lighting, and air quality, (O'Flaherty, 2016).

The work involves the coordination of services and handling critical issues, which constitutes an increased level of stress. Apart from physical and environmental factors that cause stress in the aviation industry, there are other sources of stress. For instance, employees might have a conflict with the demand for excellent services or face pressure from top management wanting instant performance. An unpleasant situation may present itself when the employees try to satisfy management and bow to work pressure. Such may result in the transfer of pressure to customers and unable to communicate or serve them properly (Cheng-Hua & Hsin-Li, 2012; Yang & Tseng, 2010)

The amount of a stress a person experience at work can derive from the intensive role of employee participation, interpersonal conflicts at the workplace, work demands and their intrinsic nature, slow progression of careers as well as the fragmented nature of organizational structure and climate (Faragher et al., 2004). According to Cooper and Marshall's model of 1976, five causal factors of workplace stress are conceptualized. Johnson et al., (2005) have concluded the five sources including:

- (1) Intrinsic to the job, including factors such as poor physical working conditions, work overload or time pressures;
- (2) Role in the organisation, including role ambiguity and role conflict;
- (3) Career development, including lack of job security and under/over promotion;
- (4) Relationships at work, including poor relationships with your boss or colleagues, an extreme component of which is bullying in the workplace; and
- (5) Organisational structure and climate, including little involvement in decision-making and office politics

2.2 The Effect of Stress

The effect of stress on humans can either be negative or positive; the consequences can be psychological and physiological. Stress is usually perceived as an adaptation process. The absence of stress could result in the body being too relaxed and not active enough to cope with demanding situations. The nervous system is affected by stressful situations and aligns with the way the body deals with it. There is an increased discharge of epinephrine (a type of adrenaline) in the bloodstream. Such is a hormone responsible for several activities in the body, which are bodily responses, it improves the metabolic rate, stimulates heart actions, and increases the blood pressure. Adrenaline is a stimulant that is powerful in helping the body to respond to specific situation and cope with stressful situations. An excessive release of adrenaline may occur when an issue is too harsh or overwhelming. Excessive release of epinephrine results in over-stimulation and someone in that

position may not be able to cope with stressful situations. Such would result in I a panic which is typically at the extreme. Panic renders people useless in responding to a situation in a useful manner.

When excess epinephrine (adrenaline) is pumped into the bloodstream, the body will start to show visible signs of stress. The very first and necessary steps of managing stress are to recognize the signs the body exhibit due to stress (Muhammad, 2017). The common symptoms of stress are physiologically related, such as chest pains, high blood pressure, and increased pulse rate. Respiratory related symptoms of stress are dizziness, hyperventilation, and shortness of breath. Other random physiological symptoms of stress are headaches, muscular tension, lack of sleep (Ahmad & Zakaria, 2015). Psychological symptoms of stress are depression, guilt, low self-esteem, anger and loss of control.

Furthermore, the typical effects of stress in most situations includes: poor judgment, difficulty in focusing or concentrating on a task, mistakes, poor memory, sluggishness, low morale, cutting corners, hyperactivity, poor decision making, looking for easy way out while ignoring serious threats, avoiding responsibility, passing it to other people, procrastination and delay of action or plans, hasty action due to adrenaline and alertness level, and unwillingness to try new things. In the case of crewmember, high significant stress during a flight result in switching to unsafe or old practices and procedures, using informal phraseology during communication, switching to local language or dialect when not necessary, searching for items in an old location (Haug, Webb, Zourrdous & Acevedo, 2013).

III. METHODOLOGY AND METHODS

In this section, we describe the population and data collection techniques, the instrumentation, and the data analyses used.

3.1 Population and Data Collection

The population in this study was the 150 Ground Service agents based in Bangkok Station employed by Bangkok Airways Public Company Limited. All of Ground Service agents were sent a questionnaire online with a statement that completion of the questionnaire would constitute agreement of informed consent. There were 114 questionnaires returned.

The majority of faculty were female (86.0%). The average range of age was 31-40 years old (45.6%), with almost the same percent in the age below 30 years old group (44.7%). Most had Bachelor degree (91.2%). More than 7 years of working experience in this company were the most participants of this sample (48.2%). An average of working hours was 40-48 hours per week.

3.1 Instrumentation

The questionnaire contained three sections - Demographic information, Five Source of Stress at Work, and Stress Level. The language used in the questionnaire was Thai.

Five Sources of Stress at Work. This instrument was developed based on Cooper and Marshall's model (1976). There were 25 items with a five-point Likert-type scale. (1, "strongly disagree" to 5, "strongly agree"). The instrument included five dimensions, Job Characteristics; Role of employee participation;

Progression of careers; Relationship in the workplace; Organizational structure and climate. The overall reliability is 0.78.

Stress Level. This instrument was developed by Department of Mental Health Thailand. The participants were asked to assess their stress level within the last 3 months by giving frequency rating score (1, “never” to 5 = “always”). The total items were 10, with the overall reliability at 0.89.

3.2 Data Analysis and Results

3.2.1 Descriptive Statistics

In Table 1 presents the overall mean values and relationship of Five Sources of Stress at Work and Stress Level among Bangkok Airways Ground service agents. The results of the Pearson showed that each dimension of Five Sources of Stress was positively related to the level of stress. The category that correlated the highest was “Relationship in the workplace” (r = 0.81), The correlation between an aggregate Five Sources of Stress and Stress level was also positively related (r = 0.47).

Table 1 Means, Standard Deviations, and Correction

Variables	Mean	S.D.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Job Characteristics	3.02	.52	1						
(2) Role of employee participation	3.12	.76	.94**	1					
(3) Progression of careers	3.76	0.65	.91**	.89**	1				
(4) Relationship in the workplace	3.00	0.64	.90**	.89**	.88**	1			
(5) Organizational structure and climate	3.12	0.48	.82**	.83**	.80**	.85**	1		
(6) Overall Five Sources of Stress	3.04	0.35	.98**	.97**	.95**	.95**	.86**	1	
(7) Overall Stress Level	2.75	0.71	.65**	.69**	.49**	.81**	.69**	.47**	1

** . Correlation is significant at the 0.01 level (2-tailed).

3.2.2 Stepwise Multiple Regression

The use of stepwise regression analysis was conducted in which each stress force was entered as predictors and level of stress as an outcome variable. This aimed to determine which stress source was affected the level of stress among Ground Service Agent. The result as presented in Table 2 showing that “Role of employee participation” had a significant positive effect

on the level of stress and explained 48% of the variance in stress level, followed by “Relationship in the workplace”, adding 4% to the total explanation of variance of 51% in stress level. Moreover, standardized Beta weights were significant (p <0.01) for the two retained variables as shown in Table 2.

Table 2 Impact of Leadership behaviors on organizational commitment

Model	R	R2	Adjusted R2	Std. Error	ΔR2	Standardized Beta	Sig.
a	.69a	.48	.48	.27	.48	.69	.000*
b	.72b	.52	.51	.26	.04	.73	.000*

a. Predictors: Role of employee participation

b. Predictors: Relationship in the workplace

IV. DISCUSSION AND RECOMMENDATIONS

Conclusively, there is a strong relationship between the five causal factors of workplace stress and the stress levels of employees. The results of this study emphasised that the Role participation factor and Relationship in the workplace are the two influential factors affecting the stress level of the Ground Service Agents. The results can interpret that due to the required conditions of the task itself, the Ground Service Agents have to rely on human coordination. Also the employees may find themselves working with multiple supervisors and co-workers due to the duty limitation, therefore they get caught up in

situations where they do not know whose instructions to follow or what exactly is expected of them.

In addition, the result also supported Marshall and Cooper (1976) model that interpersonal relations among employees can trigger work stress. This could be the relationship that exists between employees and their supervisors, fellow worker or subordinates. Concerning the organizational structure/ climate factor, Cooper and Marshall (1976) indicate that things like management style, communication patterns and the extent of an employee’s participation in decision-making can affect an employee’s work performance.

Employees must have the knowledge to manage stress during operations time that may be different as the shift-work condition is required. The methods to deal with stress are reactive and proactive (Vindas et al., 2017). Actions taken beforehand to prevent stress are called proactive, which enables one to improve the reactive coping methods. For instance, using some emergency methods or having an excellent plan is preventive and makes it much easier to manage sudden occurrences. Generally, regular rehearsal and preparation make one to acquire mastery and self-belief, which could eminently reduce stress level. Specific stressors encountered in flight could be challenging to avoid (Radhika, 2018). The most suitable measure for coping with most stressors encountered in the aviation industry involves a combination of serious training before a performing the task with corrective measures while in operations (Dural, & Genc, 2009).

Therefore, the organization should regularly train the cabin crew members in order to equip them with the knowledge of methods of managing some flight situations not always experienced and how to deal with tough situations to reduce stress that are not frequently encountered and the ability to apply these methods effectively, in order to ensure safety and minimize stress (Peksatici, 2018). Furthermore, the organization should help the Ground Service Agents to put plans in place before a flight to manage scenarios and threats should they occur and adequately inform them about the plans. This will enhance their alertness and ability to handle stressful situations. Again, the organization should ensure to make good use of all resources in their possession that will help the crew deal utilize information and bring down stress levels. The organization should also try to share tasks to reduce too much workload and advise the Ground Service Agents to do things beforehand when possible, to avoid rushing behaviors (Peksatici, 2018).

V. CONCLUSION

The intrinsic nature of work demands could translate into long working hours for employees due to heavy workloads that in turn creates a work-life conflict causing direct consequences on the well-being of employees and consequently high-stress levels. Sometimes the nature of work leaves employees without any sense of autonomy, meaning that they cannot make even the most basic decisions leaving them under so much pressure.

It is essential to find ways to deal with employee's stress before and after flights. Utilizing proactive and reactive measures is a great way to solve acute stress (Vindas et al., 2017). Proactive measures are otherwise known as preventive and are better than having to cope reactively. It would be better to simulate emergencies beforehand than dealing with the situation when it happens. It is about preparation and practice creates confidence and ultimately reduces the stress level (Vindas et al., 2017). Indeed, many stressors cannot be avoided, and the best way to prevent them is to prepare for them ahead of time (Dural, & Genc, 2009).

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Intrusion Detection System for Structured Query Language Injection Attack in E-Commerce Database

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Abstract- The weakness of the web due to the recent trend of sophistication in cybercrime has awakened the interest of researchers in securing web applications. Hence web-based information assets are not secured with increased tendency of hackers to break in. The enhancement in the features of database servers has made most of the web applications use Relational Database Management Systems (RDBMS). Attackers use SQL injection to gain unauthorized access to databases and manipulate all the valuable information stored therein. That has created interfaces that are not free from attack due to the susceptibility of risk attack in the web application called Structured Query Language (SQL) Injection. The risk of such attacks increases if the web application issues error messages each time the attacker makes an attempt. These messages guide the attacker in reconstructing SQL statement. Again, if the web application is an open source, the attacker can find potential vulnerable statements before launching the attack. The SQL injection passes SQL statements to the database directly to retrieve and/or modify valuable data. This paper focuses on the introduction of an SQL injection attack filter layer (SIAFL) to verify user inputs and filter out the known attacks. The system was modeled using Object Oriented Methodology (OOM) and developed in Visual Studio 2008 with SQL Server 2008.Windows 7 was used as the operating system
Index Terms- Web-based Information, Cybercrime, Hackers, Intrusion, Database, E-commerce, SQL

I. INTRODUCTION

The invention of information technology has led to most businesses being done in the electronic platform. Applications like e-commerce and social networking create avenue for communication and rendering of online services. The ease of running most businesses online creates some loop holes that hackers exploit. There are many strategies and tactics used by hackers to steal company's valuable information. Hacking techniques that are easily used are malware, phishing, SQL Injection Attack, Cross-Site Scripting (XSS), Man-in-the-Middle Attack and credential Reuse. Among all the attacks, Structured Query Language (SQL) injection attack is increasingly becoming a danger to e-businesses that operate on the web. SQL injection attack is an attack in which malicious code is inserted into application database with an intention of breaking the security authorization of that system. This method works on the principle that any constructs of SQL statements sent to the database server

will be executed by the server. In 1987 Dorathy E. Denning proposed intrusion detection as an approach to counter the computer and networking attacks and misuses [1].

Generally an intruder is defined as a system, program or person who tries to and may become successful to break into an information system or perform an action not legally allowed [2]. Intrusion is referred as any set of actions that attempt to compromise the integrity, confidentiality or availability of a computer resource [3]. The act of detecting actions that attempt to compromise the integrity, confidentiality, or availability of a computer resource can be referred to as Intrusion Detection [3]. Intrusion Detection System (IDS) is a device or software application that monitors network and/or system activities for malicious activities or policy violations and produces reports [4].

SQL is the language for manipulating a relational database. Create, retrieve, update and delete can be done on a database using SQL. Servers that holds critical information for websites use SQL to manage the information in their databases. SQL injection attack is lunched on this kind of servers. Unfortunately, the server may divulge important information it shouldn't. This creates a big problem if private information of employers or customers such as usernames, passwords, credit cards etc are stored on such server.

When an intruder is well versed in the knowledge of SQL, he can maliciously send inputs which are not properly checked or validated by a system and that results in vulnerability that can easily be exploited. Intruding into the database via SQL injection attack has caused great damages to e-commerce. The integrity and confidentiality of data stored in the database has been compromised. In an online business, an intruder can gain access unauthorized through SQL injection attack and make changes to the prices of the commodities and make purchases. He can also make use of administrative privileges and alter important information stored in the database. This causes great losses to businesses that thrive online. These problems necessitated the need for the design and implementation of an Intrusion Detection System which is aimed at detecting and preventing SQL Injection attack form of intrusion. A Structured Query Language injection filter layer (SIAFL) is introduced to detect and filter known attacks for an online supermarket portal that sells its products online.

II. RELATED WORKS

In order to detect and prevent SQL injection attack, many researchers had developed a variety of methods over time, since the first public discussions of SQL injection started around 1998 [5].

[6] Looked at A Closer Look at Intrusion Detection System for Web Application. The authors discussed a number of unique characteristics of the web applications and its traffic which pose challenges to designing a web IDS and explained their effects concerning the design of IDS. Their paper would highly facilitate for developers to craft an efficient architecture of the web IDS.

[7] Proposed an Online Database Intrusion Detection System Based on Query Signatures. The system they put forth was shown to protect the web application from SQL injection (SQLI). The system they proposed uses a new technique of signature-based detection. It depends on secure hash algorithm (SHA-I), which is used to check the signature for submitted queries and to decide the validity or invalidity of submitted queries. The system proposed can differentiate and prevent attempts by hackers through detection of the attacker, blocking his/her request and ensuring he/she is prevented from accessing the web application again. Sqlmapproject attacking tool was used to test the proposed system. The web application was attacked with Sqlmapproject (built using PHP and MySQL server) before and after protection. The results showed that the proposed system works correctly and it can protect the web application system with good performance and high efficiency.

[8] Presented an efficient method that the detection of SQL injection is done by tampering with the input features of query strings, analysis of query relating to the sustainability for both static and dynamic manipulation of users queries.

[9] Surveyed paper on intrusion detection techniques. Their focus was on detection method to increase the detection rate and help the users to develop information systems that are secured. The different methods for intrusion detection discussed were Pattern Matching, State Full Pattern Matching, Protocol Decode-based Analysis, and Fuzzy Clustering for IDS. They also presented a four step approach for the generalized working of IDS to include Data collection, Feature selection, Analysis and Action.

[10] Created a schema, (SQLshield) that changes the data inputted by the user before the SQL query is sent to the database server. It deploys a randomization technique. This technique makes it impossible for the execution outcome of SQL query to deviate from its programmer intended execution.

[11] Proposed a misuse detection system called (DEMIDS) which was meant for relational database systems.

[12] Worked on A Review of Intrusion Detection Systems. They reviewed some of the intrusion detection systems and softwares, highlighting their main classifications and their performance

evaluations and measures. They concluded that selecting and implementing a Network Intrusion Detection System is a challenging task. To ensure a successful implantation, an organization should determine its requirements and then locate a system that meets them.

III. METHODOLOGY

3.1. Research Design.

The adopted methodology for the proposed system design is the Water-fall Model. Waterfall Model is a sequential model that divides software development into different phases. Each phase is designed for performing specific activity during SDLC (Software Development Lifecycle Methodology) phase.

3.2 Analysis of the Existing System

SQL injection attack is the type of attack that takes place in web application that executes SQL statements. These statements are launched by a database server that works with web application. Hackers can use it to gain access to sensitive information such as personal business secrets, personal discoveries, account details and so on. They can use it to skip authentication and authorization of a web page and retrieve all information stored in the database. SQL injection attack can be used to add, modify and delete records in the database.

In online Kiddies Supermarket, the portal administrator uses his privilege to log into the admin module and make changes on the product name and prices. The buyers buy at the right prices using the appropriate channel. The e-commerce database is vulnerable to SQL injection attack because there is no SQL Injection Attack Filter Layer.

The attack buyer, through an SQL injection attack issues query to the database, changes the usernames and passwords and alters the price of a commodity from N150,000 to N150 so as to buy at a much reduced rate as shown in the figure 3.1 below. The attack buyer can change this information by carefully exploiting the vulnerability of a SQL injection. He can inject SQL command as an input through web pages and change the contents of the database and prices of commodities. This will reduce the confidentiality of the database since the sensitive data in the database that can be altered with ease.

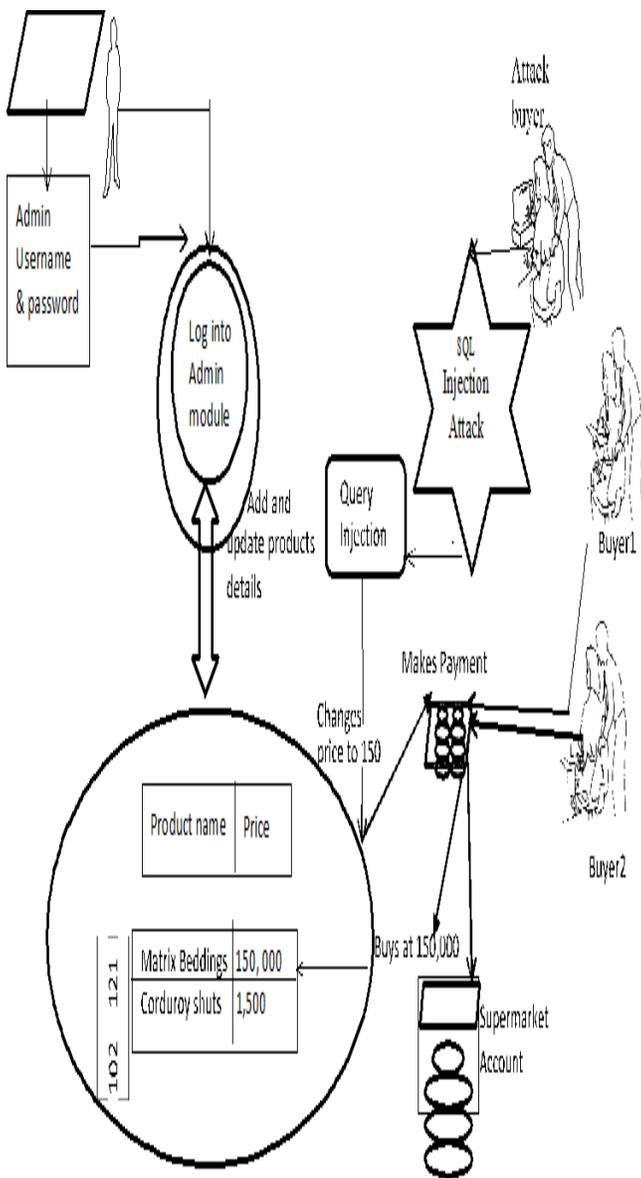


Figure 3.1: Existing System Architecture.

3.2.1 Disadvantages of the Existing System

The disadvantages of the Existing System are:

- SQL injection attack usually affects sites that uses an SQL database such as MYSQL, Oracle, SQL server or others.
- SQL injection attack that is launched successfully can result in loss of confidential data.
- Alteration of data in an online business through SQL injection can lead to great loss.

3.3 Analysis of the Proposed System

Electronic commerce, commonly known as (electronic marketing) e-commerce consists of the buying and selling of products or services over electronic systems such as the internet and other computer network [13]. SQL injection attack in E-commerce is a

trick to inject SQL query/command as an input possibly via web pages in order to change the database contents and select the price of the commodities. Many web pages take parameters from webpage, and make SQL query to the database. Take for instance when a user logs in, the web page that contains user name and password makes SQL query to the database to check if a user has valid name and password. With SQL injection, it is possible for an attacker to send crafted user name and password field that will change the SQL query and grant something else.

The first part in developing an intrusion detection system for e-commerce was to develop an online shopping of Kiddies supermarket. The online supermarket was developed using ASP.Net which is an advanced software for developing web applications. A customer makes his transactions online and enters his details including the credit card information for online delivery. Making changes to the Kiddies Supermarket website or the database is being done by a web master administration or those with privileges to make changes. The administrator enters his username and password before he is granted access to the software. When an authorized customer submits his credentials, an SQL query is generated from these details and submitted to the database for verification. In order words, the web application that controls the login page will communicate with the database through a series of planned commands so as to verify the username and password combination.

By means of SQL injection, the hacker may put in well-constructed SQL commands in a specific manner with the purpose of diverting the login form barrier and seeing what lies at the back of it. This opportunity is achievable only if the inputs are not well scrutinized and sent alongside with the SQL query to the database. SQL injection susceptibility to attack provides the means for a hacker to pass on information in order to alter the records in a database. The technologies that easily fall prey to this attack are dynamic script languages including ASP, ASP.NET, PHP etc.

In the proposed system, there is an introduction of an SQL injection attack filter layer (SIAFL) to filter out the know attacks. The Object Oriented Methodology (OOM) was used for this system development. The rationale behind OOM is to design the logical design from a physical design based on noting and recording the features of the "real world". OOM is a new system development approach encouraging and facilitating re-use of software components. This methodology can be used to design and implement a robust system based on reuse of codes of existing component and this makes easy the sharing of its small units by other systems. The architecture of the proposed system is shown in the figure 3.2

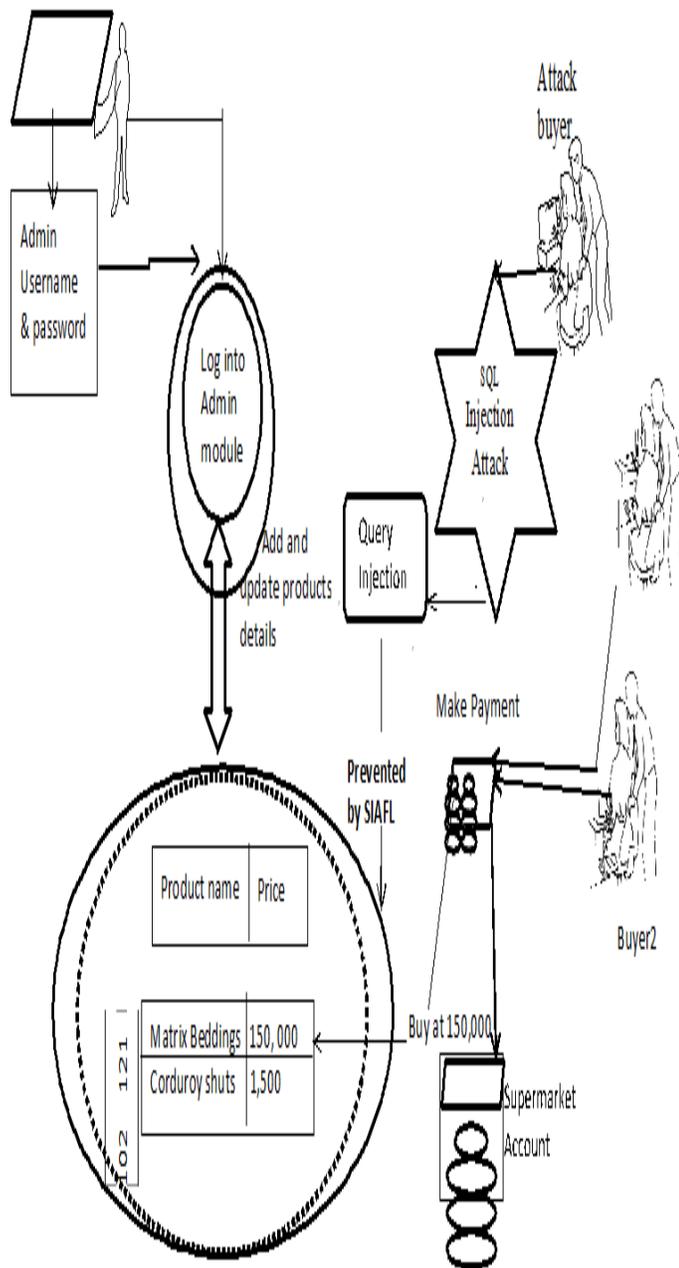


Figure 3.2: Proposed System Architecture

3.3.1. Advantages of the Proposed System Components

The following advantages of the Proposed System are:

- i) SQL injection attack filter layer (SIAFL) carries out data sanitation and validation
- ii It blocks and prevents alterations to data.
- iii Hackers are denied knowledge of database structure which usually comes from error messages.

3.4. Overall System Flowchart of the Proposed Intrusion Detection System

3.4.1. The System Flowchart of the Online Shopping Transaction.

The Flowchart of the Online Shopping Transaction is shown in figure 3.3.

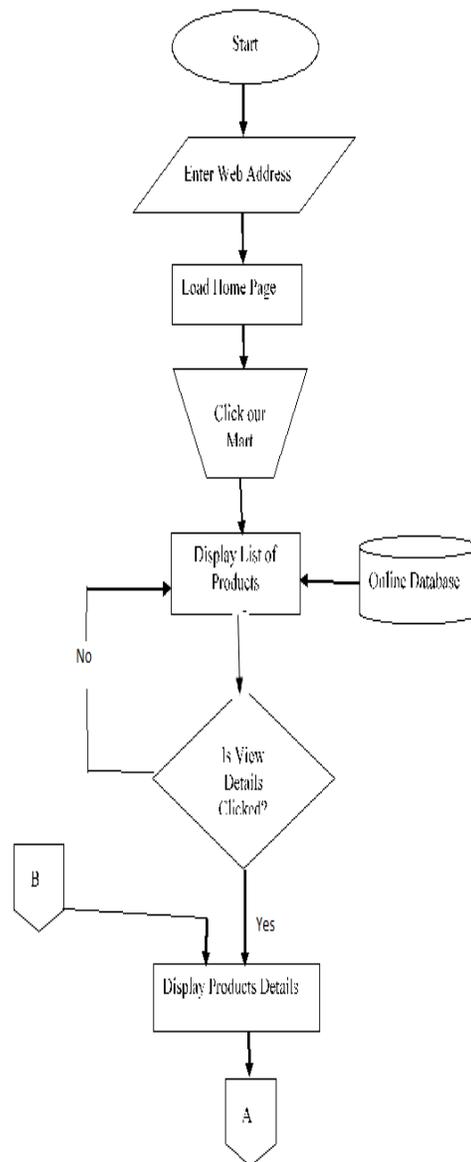
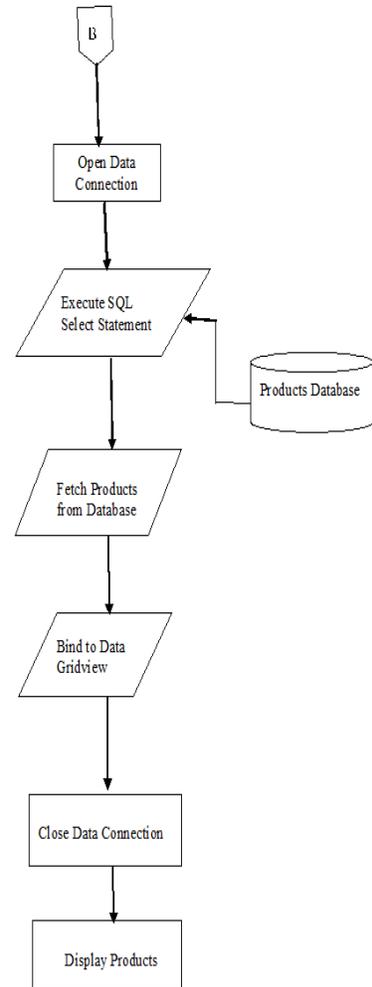
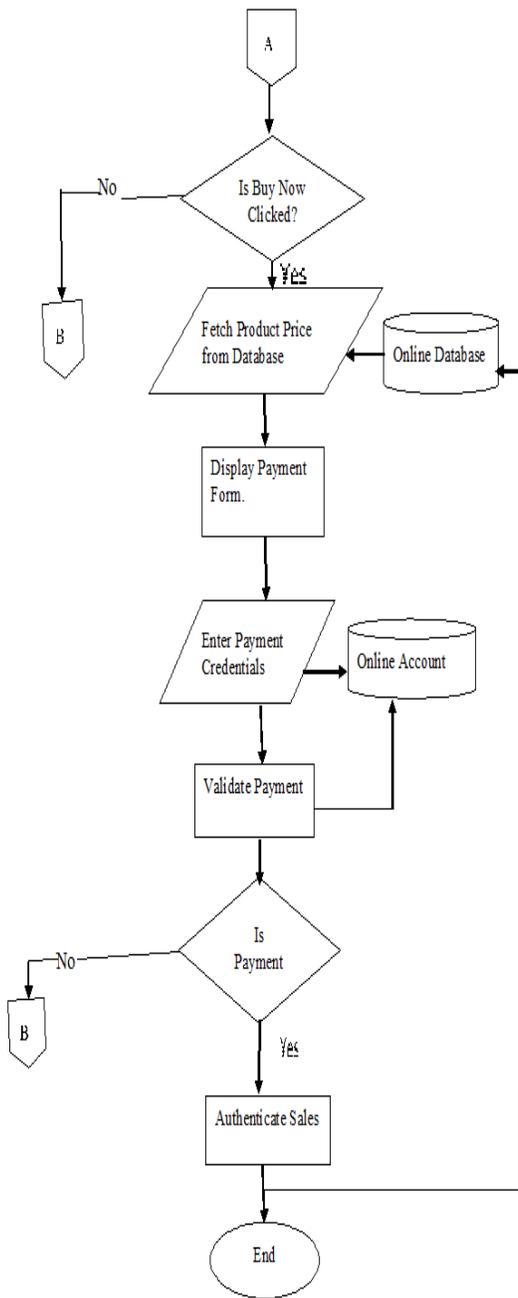


Figure 3.3. System Flowchart of the Online Shopping Transaction.



3.4.2. SQL Injection Attack Prevention Flowchart.

The flowchart for SQL Injection Attack Filter Layer in figure 3.4

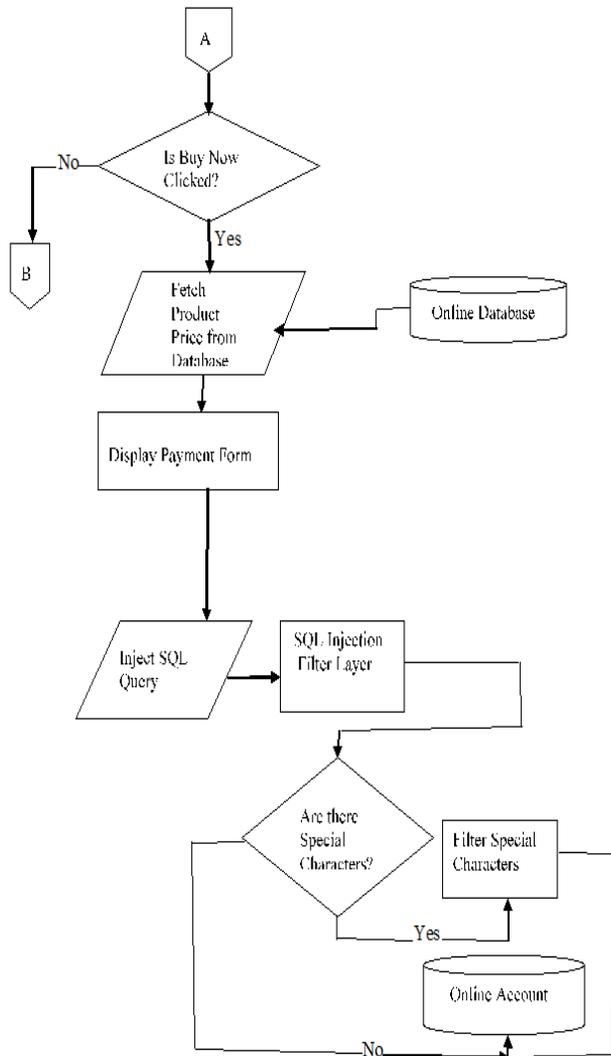


Figure 3.4. System Flowchart of SQL Injection Attack Filter Layer

IV. IMPLEMENTATION AND SAMPLE RESULTS

Following the system architecture, database design and Object Oriented Methodology, the system coding was achieved. Microsoft SQL 2008 server was used as a Database Management System. A new database named Online Supermarket Database was created using the SQL Server Enterprise Manager Panel. The following tables and their corresponding parameters were created for the database.

- dbo.CardType
- dbo.Category
- dbo.Products
- dbo.Purchase
- dbo.PurchaseDetails
- dbo.State
- dbo.Users

To access the web pages, Internet Information System was installed on the machine for hosting the web pages. The website was built using ASP.NET. ASP.NET was used to create web pages and web technologies and is an integral part of Microsoft's .NET framework vision. Graphical Interfaces Creation were created as modules to give the various methods the expected parameters. Visual Studio was used as a tool for designing the interfaces using the control toolbox which consists of textbox, image buttons, labels etc. The system was tested and some sample outputs (screen shots) as depicted in figure (a-c) were obtained respectively.



Figure 4.0 (a): Home Page for Online Kiddies Supermarket.



Figure 4.0 (b): Payment Details for Goods Bought

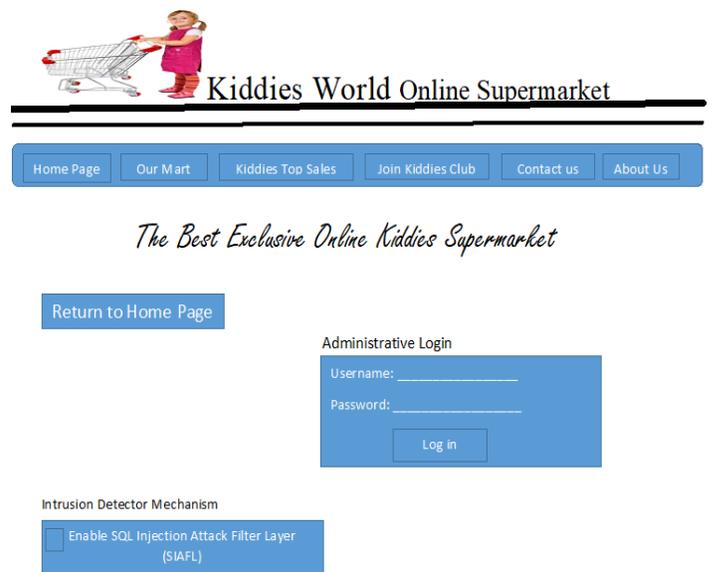


Figure 4.0 (c): Admin Login Page with SQL Injection Attack Filter Layer

V. CONCLUSION

If an attacker can construct an SQL syntax correctly and launched it on a database server, he or she can succeed in carrying out SQL Injection Attack. Once an incorrect query is sent to a database server, an error message will be generated. The attacker will read the error message generated as a result of the incorrect query. This will guild him to construct again the logic of the original query and then he will understand how to perform the injection correctly. The SQL Injection Attack Filter Layer (SIAFL) has proved to be successful in detecting SQL injection attack in e-commerce. With this, there is significant level of reliability in online businesses.

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The Perceived Role of “Igbe” Cultural Practice in the Development of Mental Illness among the Tiv People of Benue State Nigeria.

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Abstract: This study investigated the perceived role of “Igbe” cultural practice in the development of mental illness among the Tiv people of Benue State. The “Igbe” cultural practice has been part of the Tiv ancestral culture and despite attribution of the practice to the development of some mental illnesses no empirical evidence has been established. A quantitative and qualitative design was utilized for the study. A purposeful and convenient sampling technique was used for the study. A total of 1540 participants comprising of 1037 (64.8%) male and 503 (31.8%) female were sampled for the study. The Igbe Inventory a self-developed inventory by the researcher for the measure of Igbe cultural practice was used for data collection. Three hypotheses were tested using simple linear regression, independent t-test and univariate analysis of variance. It was found among others that Igbe cultural practice played a significant role in the development of mental illness among the Tiv people. The result also showed a significant gender difference in the development of mental illness among the Tiv people and a significant interactive effect of age and sex on Igbe cultural practices in the development of mental illness. Based on the study findings, recommendations were made.

Keywords: Igbe, cultural practice and mental illness.

INTRODUCTION

Illness, either mental or bodily, implies deviation from some clearly defined norms of the society (Szasz, 1960). That is why, when any human being changes his/her behavior unexpectedly and behaves differently from the normal way of life, the public construes these signs as mental illness. These changing behavioral indications are described by Muslims as possessed by ‘Peer’ and illustrated by Hindus as possessed by ‘Goddess’ (Behere, Das, Yadav & Behere (2013). Due to the lack of instruments or devices through which we can measure the exact cause of this changing behavior a lot of causes come into the picture for mental illness. As a result, culture is playing a major part in determining the different causes of mental illness and shape the treatment process accordingly. The people sometimes blame demonic spirits or curse of the past life as the cause of mental illness (Magnier, 2013). The concept of mental illness is changeable over time, but it is specific to culture at a given time in its history (Foucault, 1965; Szasz, 1960). Culture has a prominent role in the perception, experience, response, treatment, and outcome of mental illness (Siewert, 1999). Culture not only influences the mental illness, but also it is an essential part of it (Sam & Moreira, 2012).

Many cultures view mental illness as a form of religious punishment or demonic possession. In ancient Egyptian, Indian, Greek, and Roman writings, mental illness was categorized as a religious or personal problem. In the 5th century B.C., Hippocrates was a pioneer in treating mentally ill people with techniques not rooted in religion or superstition; instead, he focused on changing a mentally ill patient’s environment or occupation, or administering certain substances as medications. During the middle Ages, the mentally ill were believed to be possessed or in need of religion. Negative attitudes towards mental illness persisted into the 18th century in the United States, leading to stigmatization of mental illness, and unhygienic (and often degrading) confinement of mentally ill individuals (Linda, 2013).

Available information indicated that culture can be associated with mental illnesses including better mental and physical health, better coping and higher well-being (Arndt, Kazimierz & Janusz, 2014; Chittaranjan, 2014). Nigeria is a culturally diverse country where it is believed that, in every 40.234 kilometers we come in contact with people from a diverse culture. Nigeria is also associated with more spiritual traditions from primeval times; and is known as a home of all cultures. Culture plays a vital role in directing, shaping, and modeling social behavior at both individual and group levels (Pandey, 1988). The culture shapes the cause and probable treatment

of mental illness. The perspective and perception of mental illness and treatment practices also vary with the respective culture (Wagner, Duveen, Themel & Verma, 1999).

In Tiv culture, the onset of mental illness is basically associated with the superstitious powers of Akombu (Igbe). Akombu is the general deitic term that encompasses all aspect of Tiv various superstitious Goddess powers which Igbe is one among and has its specific function and effects that lead to differentiation from other powers. This is known through the signs and symptoms of the person experiencing the Igbe by the elderly people of the land and such a person is taken to the appropriate place for treatment. Akombu (Igbe) can be defined as a Tiv deity that is responsible for irregular menstruation, abortion, serious vomiting, bleeding, impotence in men, fertility of the land, badluck and infertility in women (Gbenda, 1979). According to an informant, Timve (2018), a native doctor from Mbatyav of Gboko Local Government, "Igbe is a specific problem or illness that is used by the Tiv people as a means of social control within the community because it cannot just affect someone, it is either the person has stolen something that the Igbe is used to protect, or the person walked close to the emblem or touched the emblem or if consciously or unconsciously the person urinates close to the emblem, then he or she automatically becomes a victim of Igbe". Also according to another informant, Atorough (2018), a native doctor from Kwande Local Government, that Igbe in Tiv land has its origin from the ancestral father of the Tiv people called Tiv and is a very strong deity among Akombu that is used specifically for the protection of agricultural products and can cause a great deal of mental illness to any person that touches or steals such product. And if not dictated quickly can lead to death within a couple of days (Agber, 2014).

Culture and Mental illness cannot be isolated. Culture plays a crucial role in the perception of mental illness. Cultural relativist emphasizes that concepts are socially constructed and vary across cultures. Mental illness is a social construct. Hence, different cultures have their own beliefs to find the etiology of mental illness, as well as treatment and intervention processes (Jimenez, Bartels, Cardenas, Dhaliwal & Alegría, 2012). Kroeber and Parsons (1958), define culture as a transmitted and created content and patterns of values, ideas, and other symbolic meaningful systems as factors in the shaping of human behavior. Culture consists in patterned ways of thinking, feeling and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values. There are significant variations in the cultural views of mental illness across cultures (Mehraby, 2009). Culture influences the epidemiology, phenomenology, outcome, and treatment of mental illness (Viswanath & Chaturvedi, 2012).

In Tiv cultural society "all mental illness is attributed to the violation of a particular "Akombo" for example, "Akombo" "a Igbe" is the protective emblem whose violation results in infection by dysentery" (Hagher, 1989). Indeed, in Tiv mytho-lectics, diagnostic symptoms of mental illnesses and diseases: cough (houghtingir), common cold (gbakundu), whooping cough (hough u bar), fever (iyolhian), malaria (iyolgenger), gangrene (ibya), dysentery, diarrhea (akongu a haan, igbeinyian), diabetes (suga), body aches, paleness of skin, drooping eyelids, anaemia, wiry or falling hair (veekombo); impotence, infertility, hemorrhage, (ikyôôr, akomboadam, akombogbande); rashes, boils, blisters, hard scaly pimples, distended belly, rheumatism, gastronomic disorders and ulcers, sores in the private parts, helpis, etc and other psycho-social maladies of ill-luck, poverty, joblessness, childlessness are all covered by the pantheon of Tiv trado-religious medicare and have appropriate cult discourses associated with the controlling akombo deities (Hugh, 2010).

The spirit behind the various Akombo is always associated with natural phenomena to which they can be summoned at will by the human agents (Mbatsav). In other words, their presence is usually enshrined in natural objects and images, which are artistically carved or adorned, or beautifully designed amulets, fetish threads, perfume, cultural hold all-bag (Ikpaibôr), etc. These objects and images go by various Tiv appellations including "Imborivungu", "Atsuku", "Ubende", "Ikpyagher", "WunaIngban-Ijôv", "Poor", "AtsuKwase", "Laya", "Swem", "Gbegba", etc. These are material symbols of cultural significance. The cultural artifacts are simply the product of the creative imagination but they are considered essential in the visual representation of the supernatural forces and their evocative potency. In fact, there is profound visual poetry and artistry in their design and presentation.

Downes (1933), for instance, gives a graphic description of the artistic input that goes into the design of the Tiv "Imborivungu" cultural masterpiece: It consists of portions of the actual femur bone of the departed family father, with a voice hole in the centre. The lower end of the bone is covered with fine, strong membranes of the spiders egg capsule or it is said sometimes bat wings (both of which have significance as belonging to animates of nocturnal habits) firmly fixed in place with gum and this forms a vibratory medium. The upper end of the bone is inserted and firmly fixed into the base of the actual skull of an ancestor which is dressed with human hair said to be that of the ancestors and decorated with asah (beads). Actually, "Imborivungu" is symbolically an embodiment of an abstract discourse through which the living pay homage to the great ancestor spirit and is said to be part of the traditional spirituality.

It is obvious that right from origin the Tiv people had a strong tie with Igbe cultural practice to the development of mental illness but no research was ever been carried out to relate this variable to the development of mental illness in Tiv land which is the focus of this study.

Statement of the Problem

In Tiv land, Igbe cannot be isolated from the development of mental illness. The role of cultural practice of Tiv is so much attached to the development and treatment of mental illness that if investigated will add to the knowledge of culture bound syndrome in the field of mental health. Igbe in Tiv land has received a lot of attraction by various researchers in other fields of study, although in the field of clinical psychology no research has so far been carried out concerning Igbe to the development of mental illness which the present study considers as a great lacuna that needs to be filled. Also the Tiv cultural practices plays a significant role in the development and treatment of mental illness which researchers can search for ways of diagnosis, management and promotion of mental health in Tiv land.

The researcher's desire is for mental health professionals to start looking at inward causes and treatment of mental illness rather than totally relying on the Euro-American perspectives. Apart from that, cultural practices of a particular ethnic group can bring out new perspectives if investigated in the field of clinical psychology that will help in identifying the etiology of mental illness and how such mental illnesses can be treated.

There is every need to find out how Igbe cultural practices among the Tiv culture influence the development of mental health as this will go a long way to add to the existing knowledge of the impact of cultural practices in the development and treatment of mental illness.

Purpose of the Study

The purpose of this study is to investigate the perceived role of "Igbe" cultural practice in the development of mental illness among the Tiv people of Benue State. The study aim at (1) examining the influence of "Igbe" cultural practice on the development of mental illness among Tiv people in Benue State (2) determining if "Igbe" cultural practice influence the male more than their female counterparts in the development of mental illness among the Tiv people of Benue State (3) ascertaining the interaction effect of age and sex on the influence of "Igbe" cultural practice in the development of mental illness among the Tiv people of Benue State.

Methodology

Research Design

The design of the study is both qualitative and quantitative research design because questionnaires and focus group discussion were applied for data collection. A focus group discussion on Igbe in the MINDA geopolitical zone of the Tiv was carried out by the researcher to elicit information which formed the development of the Igbe instrument that was used for data collection from the participants. Igbe cultural practice was the independent variable and mental illness as the dependent variable. The developed instrument was used for data collection in the remaining four geopolitical zones comprising of Jechira, Jemgbagh, Kwande and Sankera respectively.

Setting

This research was conducted in the five geopolitical zones of the Tiv speaking areas of Benue State. This is because Igbe deity is mostly peculiar to the culture of the Tiv people but can also affect other tribes. The Tiv form the largest ethnic group in North Central Nigeria and are the largest ethnic group in Benue State. They settled on both banks of the river Benue. The group constitutes approximately 3.5% of Nigeria's total population, and numbered about 6.5 million individuals throughout Nigeria and Cameroon. The Tiv are the 4th largest ethnic group in Nigeria. Bahannan expresses, that, their home land stretches from approximately 6⁰ to 100⁰ east by the Hausa speaking Mada, the Jukun and Chamba, to the North by the Alago and Akwa, to the south by the Udam (Shishima, 1993). The Tiv occupy 14 Local Government Areas, which are as follows; Kwande, Makurdi, Ushongo, Vandiekya, Konshisha, Ukum, Gboko, Logo, Gwer, Gwer West, Guma, Katsina-Ala, Buruku and Tarka respectively. The Tiv people are basically farmers and the language spoken by them is known as Zwa Tiv (Tiv Language) with little variation among the various districts. The concept of Aondo (God), Tsav (Witchcraft), Ujijingi (Spirit) and Akombo (Rituals) which Igbe is part of constitute the sum total of Tiv world view, religion permeates all facets of life (Shishima, 1993).

Participants

The participants for the study comprised of the four selected geopolitical zones of the Tiv areas which include; Jechira, Jemgbagh, Kwande and Sankera. This does not include the MINDA zone because the zone was used by the researcher for pilot study to establish the psychometrics properties for the developed Igbe inventory. The population of the four zones was estimated at 2,451,833 (Census, 2006). Out of the total population of the zones, a sample size of 1540 between the age ranges of 19 to 80 years was used as participants for the study. Out of the total population of the study, 1037 (64.8%) were male while 503(31.8%) were female and 60(3.8%) were missing. Also 151(9.4%) participants had no formal education, 119(7.4%) had primary education, 251(15.7%) had secondary education, 1002(62.6) had tertiary education and 77(4.8%) were missing. Again 284(17.4%) participants were farmers, 240(15%) were civil servants, 492(30.8%) were students, 428 (26.8%) did not mention occupations and 156 (9.8%) were missing. Furthermore, the marital status of the participants showed that 535(33.4%) were single, 910(56.9%) were married, 26(1.6%) were separated, 43(2.7%) were widowed, and 86(5.4%) were missing. In addition, participant's religious affiliation indicated that 1445 (90.3%) were Christians, 26(1.6%) were Islam, 55(3.4%) were African traditional religion, other religious were 13 (.8%) and 61(3.8)

missing. Lastly, the denominations of the participants showed that, 482(30.1%) were Catholics, 463(28.9%) were Pentecostals, 88(5.5%) were protestants, other denominations were 15(.9%) and 552(34.5%) were missing respectively.

Sampling

A convenient and purposive sampling technique (non –probability sampling method) was used for the selection of the 1540 participants who were from the selected four geopolitical zones of the Tiv people because of their convenient accessibility and for the purpose of the research.

Instruments

The study used the following instrument: Igbe inventory.

Igbe Inventory

The Igbe inventory is a self-developed inventory by the researcher for the measure of Igbe. The Igbe inventory was developed through a focus group discussion study to elicit information which formed the development of the instrument, and pilot study for validation and reliability of the instrument was conducted using the MINDA group. A focus discussion group was organized by the researcher which assisted in the transcription of the items of the questionnaire that was administered to the participants in the MINDA geopolitical area of the Tiv people. The focus group was divided in to three groups, group one comprised of 12 people, group two 7 people, and group three 9 people totaling 27 participants. All the 27 participants were people who had experience about Igbe and have seen the effect of Igbe on Igbe victims. Through the discussion, the researcher took comprehensive notes which helped in the transcription of the focus group discussion to questionnaires. These questionnaires were then re-evaluated by the members of the focus group and validated by different lecturers of Benue State University before it was used for pilot study for reliability testing. The result of the pilot study indicated a reliability coefficient about knowledge of Igbe Cronbach’s Alpha of .45 while experience about Igbe indicated a reliability Cronbach’s Alpha of .90 and the reliability for all the variables indicated .86 respectively. The result of the pilot study generally indicated a high level of reliability of the Igbe inventory.

Procedure

The researcher travelled to the selected four geopolitical zones of the Tiv people and administered 1540 questionnaires to the participants at their various residences in the villages among those who had knowledge about Igbe and those who had not. The questionnaires were shared to the participants by the researcher after they were given informed consent forms to assure them of confidentiality. In the field, most people whom the researcher met to answer the questionnaires declined with the reasons that, they don’t want to do anything with the culture of Igbe and this was particularly to people who claimed that their religious doctrines did not allow them to participate in issues that involve traditional affiliation. Apart from that, when people saw that the questionnaires were about Igbe, they were afraid because of what they might have heard about Igbe and didn’t want to involve themselves into anything relating to Igbe. It was not an easy task for the researcher to convince people to participate in the study despite the explanations the researcher gave them about the purpose of the study and assuring them of their safety. In some areas, the participants took the researcher to their chief for more explanation and clarification before they agreed to answer questionnaires that were given to them.

Data for the study were analyzed using simple linear regression, Independent t-test and univariate analysis of variance. Simple linear regression was used to test the influence of Igbe cultural practice in the development of mental illness, Independent t-test was used to test gender difference (male and female) in the development of mental illness while univariate analysis was used to test interactive effect of age and sex in the development of mental illness.

RESULTS

Hypothesis one states that Igbe cultural practice will significantly influence in the development of mental illness among the Tiv people in Benue State.

Table 1: Simple linear regression analysis summary table showing the influence of Igbe cultural practice in the development of mental illness among the Tiv people in Benue State.

Variables	R	R ²	F	β	T	P	Remark
Constant	.553	.306	590.845		22.419	.000	
Igbe cultural practice				.553	24.307	.000	Sig

F(1, 1340) = 590.845; P<.001; R=.553 and R² = .306

Result in table 1 shows a significant score. It shows the influence of Igbe cultural practice in the development of mental illness, the result shows that Igbe cultural practice has a significant influence in the development of mental illness [β -.553, t = 24.397; p<.001]. Observation further revealed that Igbe cultural practice significantly accounted for 30.6% of the total variance observed in the development of mental illness. Hypothesis one which stated that “IGBE” cultural practice will significantly influence in the development of mental illness among the Tiv people of Benue State’ is therefore accepted.

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Hypothesis two states that the influence of “Igbe” cultural practice will significantly differ between male and their female counterparts in the development of mental illness among the Tiv people of Benue State.

Table 11: Independent t-test summary table showing gender difference (male and female) in the development of mental illness

Dependent Variable	Group	N	Mean	SD	SE	t	Df	P	Remarks
Mental Illness	Male	909	12.65	2.62	.087	5.323	1397	.000	Sig
	Female	490	11.79	3.02	.136				

Result in table 11 shows influence of “Igbe” cultural practice on gender difference in the development of mental illness among participants. The result shows that Igbe cultural practice on male differed significantly from their female counterpart in the development of mental illness [t (1397) = 5.323; p<.001]. Further comparison shows that males (Mean = 12.65, SD = 2.62) significantly scored higher compared to their female counterparts (Mean = 11.79, SD = 3.02) in the development of mental illness. Hypothesis four which stated that ‘the influence of “Igbe” cultural practice will significantly differ between male and their female counterparts in the development of mental illness among the Tiv people of Benue State’ was therefore accepted.

Hypothesis three states that there will be a significant interaction effect of age and sex on the influence of “Igbe” cultural practice in the development of mental illness among the Tiv people of Benue State.

Table 111: Univariate analysis of variance showing the interactive effect of age and sex of Igbe cultural practices in the development of mental illness

Source	Type II SSQ	Df	MSQ	F	Sig	D
Sex	170.396	1	170.396	23.757	<.001	.017
Age	41.556	1	41.556	5.794	<.05	.004
Sex*Age	122.199	1	122.199	17.038	<.001	.012
Error	9682.64	1350	7.172			
Total	236236.00	1354				

Result in table 111 shows a significant score on the interactive effect of age and sex on Igbe cultural practices in the development of mental illness in the study area. From the result, there is a significant effect of sex [F (1, 1350) = 170.396; p<.001] and age [F (1, 1350) = 41.556; p<.05] of Igbe cultural practices in the development of mental illness among the Tiv people of Benue State. The result shows based on the Eta coefficient (η) that sex reported 1.7% effect ($\eta = .017$) and age reported 0.4% effect ($\eta = .004$). On the interactive effect of sex and age, the result shows that there is a significant interactive effect of sex and age on Igbe cultural practices in the development of mental illness [F (1, 1350) = 17.038; p<.001]. The result further shows on the interactive effect that both sex and age reported 1.2% of the effect based on the Eta coefficient of ($\eta = .012$).

Discussion of Findings

Hypothesis one which states that Igbe cultural practice will significantly influence in the development of mental illness among the Tiv people in Benue State was significant. This implies that, Igbe in Tiv culture among other things contribute to the development of mental illness. This finding agrees with Sheikh and Furnham (2000) who examined the relationship between culture beliefs about the causes of mental illness and attitudes associated with seeking professional help for psychological problems. Their finding showed that cultural beliefs were positively related to the causes of mental illness. Also the result of the study is in line with Nalini (2011) who examined cultural and gender influences on mental health, health beliefs, health behavior, help-seeking and treatment expectations for mental health problems in newcomers to Canada who were members of an ethno-cultural, visible minority population -the Sri Lankan Tamils. Her finding showed a significant influence of cultural beliefs on the development of mental illness and other mental health related issues among the people. In addition the result agrees with Michelle and Patrick (2017) who investigated depression in the barrio: An analysis of the risk and protective nature of cultural values among Mexican American substance users. In addition, findings revealed that age is inversely related to depressive symptomatology. Young Mexican American heroin users who do not ascribe to traditional Latino values were highly associated with depression and therefore more vulnerable to riskier drug use behaviors. Moreover, drug-using social networks may affect the protective nature of certain cultural values. Furthermore the finding is in line with Natalio and Natalia (2005) who examined the hypothesis that cultural factors influence the relation between Perceived Emotional Intelligence (PEI) and depression. The finding revealed that depression was fundamentally associated with PEI (20% of the variance), gender (5% of the variance) and with cultural dimensions (approximately 6%).

Hypothesis two which states that victims of “IGBE” cultural practices who are male will differ significantly from their female counterparts on mental illness was significant. This implies that, the effect of Igbe differs between man and woman. This finding agrees with Dekela, (Research informant), who said that the Igbe Ikiriki (small Igbe) portends more danger to women than their men counterpart; it however, affects the men too. In women the symptoms associated with it include, diarrhea, vomiting, infertility, abortion, bad luck, barrenness, dizziness, stomach ache which makes one feel as if his intestines may cut; the pains of the stomach ache occurs around the pelvic region.

Hypothesis three which states that there will be a significant interactive effect of age and sex on victims of “IGBE” cultural practice on mental illness was significant. This implies that, sex and age have an interactive effect on victims of Igbe cultural practice on mental illness. This finding agrees with Martina and Dragan (2016) who evaluated the impact of religiosity and age on the quality of life and psychological symptoms of chronic mental patients. Their finding showed that religious activities and age of their research participants correlated with the etiology of their mental illness and mental health issues. The result is also in line with Nalini (2011) who examined cultural and gender influences on mental health, health beliefs, health behavior, help-seeking and treatment expectations for mental health problems in newcomers to Canada who were members of an ethno-cultural, visible minority population -the Sri Lankan Tamils. Her finding showed a significant influence of cultural beliefs on the development of mental illness and other mental health related issues among the people.

Conclusion

Based on the findings, it is concluded that, Igbe cultural practices among the Tiv people have a strong contribution to the development of mental illness.

Recommendations

- i. Cultural practice should always be considered by clinicians when handling issues of mental illness in Tiv land and across other tribes for effective treatment and etiology of mental illness.
- ii. Clinical professionals should not only center their clinical practice on Euro-American perspective but should be flexible in their approach to mental health issues that would consider other factors such as cultural practices of the people.
- iii. Health professionals should imbibe the culture of searching into their immediate surrounding for the causes and treatment of mental illness rather than relying on foreign knowledge that only focuses on their environment.

Limitations of the Study

- i. The research only covered the four geo-political areas in Tiv land which limit the generality of the research findings.
- ii. The research centered on only one aspect of culture bound syndrome to the development of mental illness which makes the study limited as there are other culture bond syndromes that also lead to the development of mental illness.
- iii. Not all culture-bound syndromes in Tiv culture that have history of mental illness development was captured in the study which makes the research a unidirectional study.

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The Correlation of Immunohistochemical Expression of CD20 with the Level of Tumor-Infiltrating Lymphocytes (TILs) and the Histological Grading of Cutaneous Squamous Cell Carcinoma

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Abstract- Background: Tumor infiltrating lymphocytes (TILs) have been important prognostic factor for many malignancies, including cutaneous squamous cell carcinoma (cSCC). TILs are composed of many subsets, categorized into T-cells and B-cells. The tumor immune responses of B-cells are poorly investigated and ignored for years. The role of B-cells in tumor immunology is still controversial due to the antitumorigenic effect and also the ability to increase the tumor progression.

Objective: To analyze the correlation of immunohistochemical expression of CD20 with the level of TILs and histological grading of cSCC.

Methods: This is an analytical research with cross sectional approach using the Hematoxylin Eosin staining for TILs and histological grading evaluation, together with immunohistochemical staining of CD20 for tumor-infiltrating B-cell (TiBC) evaluation. The statistical analysis with Kruskal Wallis method is used to analyze the correlation.

Results: Based on the statistical analysis with Kruskal-Wallis method for 45 samples of patients with cSCC to analyze the correlation of immunohistochemical expression of CD20 with the level of intratumoral TILs and stromal TILs, the p-values are 0,479 and 0,904 ($p > 0,005$). The correlation of immunohistochemical expression of CD20 with the histological grading showed the p-value of 0,091 ($p > 0,05$).

Conclusion: There are no relation between the immunohistochemical expression of CD20 with the level of intratumoral TILs and stromal TILs at cSCC, but the CD20 expression tends to have correlation with the histological grading of cSCC although it is not significant statistically.

Index Terms-: cutaneous squamous cell carcinoma, TILs, grading, CD20.

sun exposure, chemical carcinogen, HPV and HIV infection, chronic skin inflammation, immunosuppression, and also genetic disorder.^{4,5}

There are many factors which influence the prognosis of cSCC. The worse prognosis of cSCC is correlated with many factors, such as the tumor depth more than 2 mm, Clark level invasion of IV/V, perineural invasion, primary mass located on ears or lips, and the poor differentiation of cSCC.⁶ Tumor differentiation or histological grading is classified into well differentiation, moderately differentiation, and poor differentiation, based on the degree of anaplasia in the tumor nest, mitotic activity, and the keratin formation.⁷

Tumor-infiltrating lymphocytes (TILs) play an important role in the tumor progression, invasion, metastasis, and also the outcome of the patient. TILs can be differed into intratumoral TILs and stromal TILs. Intratumoral TILs are the lymphocytes which infiltrate into the tumor nests, while the stromal TILs are the lymphocytes found around the tumor nests.⁸ A lot of studies had been done to evaluate the role of TILs in solid tumor, such as lung carcinoma, gastric cancer, colorectal carcinoma, hepatocellular carcinoma, breast cancer, ovarian carcinoma, melanoma, and cSCC.⁹ Some of them had proven that TILs can be the independent prognostic factor which is more accurate than TNM staging.¹⁰ The previous study about the role of TILs in cSCC has concluded that stromal TILs are closely related to the histological grading of cSCC and has been suggested to be evaluated and reported routinely in the histopathological examination.¹¹

TILs has many subsets, such as CD3+, CD4+, CD8+, FoxP3+, $\alpha\beta$ T cells, $\gamma\delta$ T cells, B cells, natural killer cells, and natural killer T cells. Each subset plays the different roles in the tumor immunity.¹²⁻¹⁴ The role of B cells in the carcinogenesis and tumor immunity is still unclear. Only a few studies had been performed to evaluate its role. Some studies had showed that B cells have the antitumorigenic effect because of their ability to present the tumor antigen and kill the tumor cells directly. Others showed that B cells can inhibit the tumor regression, prevent the cytotoxic response of CD8+ T cells, and finally support the tumor progression.¹⁵⁻¹⁶ The studies about the role of tumor infiltrating B cells (TiBC) in cSCC are still limited. The previous study was performed only to compare the different densities of

I. INTRODUCTION

Cutaneous squamous cell carcinoma (cSCC) is the malignant skin tumor derived from the malignant keratinocytes proliferation of the epidermis and the skin appendages, which look similar to the epidermal spinosum layers.^{1,2} It is the second most common skin malignancies after the basal cell carcinoma with the approximate incidence rate about 20% of all skin malignancies.^{1,3} The etiology and risk factors are including the

CD20 in cSCC patients with renal transplantation and the immunocompetent patients of cSCC. CD20 is a membrane-embedded surface molecule which is commonly used to evaluate B-cells. CD20 is expressed on every stage of B cell differentiation, except the plasma cells.¹⁷⁻¹⁸ This study is aimed to evaluate the correlation between the immunohistochemical expression of CD20 with the level of TILs and histological grading of cSCC, as B cells, expressed by CD20 is part of the TILs.

II. MATERIAL AND PRODUCT

This is an analytical study with cross sectional approach, conducted at the Anatomical Pathology Laboratory of Faculty of Medicine, Universitas Sumatera Utara and also at the Anatomical Pathology Unit of Haji Adam Malik Medan General Hospital. This research was held from July 2019 until June 2020, after approved by Universitas Sumatera Utara and Haji Adam Malik General Hospital Health Research Ethics Committee.

The sample size needed for this research was calculated based on the minimum sample size formula and at least 43 samples were needed. We used 45 samples from the slide and the paraffine blocks of the patients diagnosed as cSCC. The inclusion criteria for this research were patients' slides or paraffine blocks with a pathological diagnosis of cutaneous squamous cell carcinoma which are adequate and representative with epidermal and dermal structures. The exclusion criteria included the following: (1) Slides or paraffine blocks contained minimal tissues that are not possible to be cut again for immunohistochemical staining; (2) Slides only showed the tumor cells with minimal stromal area for evaluation of TILs.

Histological grading and the level of TILs infiltration were evaluated independently by researcher, together with two pathologist using Olympus CX23 microscope. The histological grading of the cutaneous squamous cell carcinoma is based on the degree of differentiation and keratinization and divided into: (1) Well differentiated cSCC, characterized by squamous epithelium that is easily recognisable with abundant of keratinization. The epithelium is obviously derived from squamous epithelium and intercellular bridges (prickles) are readily apparent. The tumors display minimal pleomorphism and mitotic figures are mainly basally located; (2) Moderately differentiated cSCC falls in between the well differentiation and poor differentiation. The epithelial structures are more disorganized in which the squamous epithelial derivation is less obvious. Nuclear and cytoplasmic pleomorphism are more pronounced. The mitotic figures, including the atypical mitosis, can be found more easily. Tumors show less keratinization, often being limited to the formation of keratin pearls; (3) Poorly differentiated cSCC, is more difficult to establish the true nature of the lesion, unless intercellular bridges or small foci of keratinization are found. Tumors showed highly atipia nuclei with lots of mitotic figures.¹⁹⁻²⁰

The level of TILs infiltration was determined after evaluate all the fields. TILs infiltration was divided into intratumoral TILs and stromal TILs. Intratumoral TILs are lymphocytes which infiltrated into the tumor nests and were in contact with the tumor cells, while stromal TILs are lymphocytes which infiltrated surrounding the tumor nests. TILs infiltration were

categorized into four level: (1) Score 0 for no infiltration of lymphocytes; (2) Score 1 for minimal lymphocytes infiltration which were less than 10 cells / HPF; (3) Score 2 for moderate lymphocytes infiltration in which lymphocytes could be seen easily, but not in large aggregates; (4) Score 3 for massive infiltration in which the infiltration the lymphocytes formed large aggregates and could be found in 50% tumor area.²¹

Paraffine blocks were also cut once for immunohistochemical staining. Immunostaining was performed by using CD20 (L26) monoclonal mouse anti-human clone ready-to-use from Leica. Positive control was human tonsil. The CD20 expression was observed at the cell membrane. The density of the CD20 expression was categorized into three level: (1) Score 0 for no discernible infiltrates; (2) Score 1 for scattered cells without dense infiltrates; (3) Score 2 for dense infiltrates with formation of tertiary lymphatic structures (TLS).²²

III. RESULT

From 45 samples of cSCC which were evaluated ini this study, 19 cases (42,22%) were well differentiated tumors, 16 cases (35.56%) were moderately differentiated tumors, and 10 cases (22.22%) were poorly differentiated tumors. Evaluation for intratumoral infiltration of TILs showed that 13 cases (28.88%) had minimal infiltration of intratumoral TILs, 25 cases (55.56%) had moderate infiltration of intratumoral TILs, and 7 cases (15.56%) had massive infiltration of intratumoral TILs. Evaluation for stromal infiltration of TILs showed that only 3 cases (6.67%) had minimal infiltration of stromal TILs, 16 cases (35.55%) had moderate infiltration of stromal TILs, and 26 cases (57.78%) had massive infiltration of stromal TILs. The distribution samples for immunohistochemical staining of CD20 showed that 10 cases (22.22%) had no discernible infiltration of B cells (no expression of CD20), 29 cases (64.45%) had scattered B cells without dense infiltrates, and 6 cases (13.33%) had dense infiltrates of B cells with the formation of TLS.

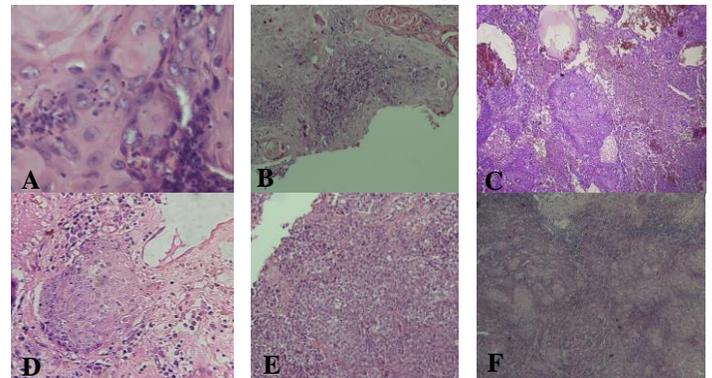


Figure 1. TILs infiltration. A. Intratumoral TILs, score 1. B. Intratumoral TILs, score 2. C. Intratumoral TILs, score 3. D. Stromal TILs, score 1. E. Stromal TILs, score 2. F. Intratumoral TILs, score 3.

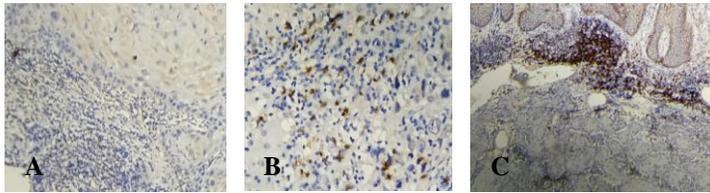


Figure 2. Immunohistochemical expression of CD20. A. Score 0 (no discernible infiltrates) B. Score 1 (scattered cells without dense infiltrates). C. Score 2 (dense infiltrates with formation of TLS)

Statistical analysis with Kruskal-Wallis method showed that no statistical correlation was found between the immunohistochemical expression of CD20 with intratumoral TILs infiltration (p-value = 0.479) and stromal TILs infiltration (p-value = 0.904) at cSCC. There is a tendency of correlation between the immunohistochemical expression of CD20 and histological grading of cSCC, although statistical analysis was not significant enough with the p-value of 0.091 (p-value > 0.005). The data are available in table 2, table 3 and table 4 (see below).

IV. DISCUSSION

Histological grading has been one of the important prognostic factors for many solid malignant tumors, including cSCC. Lots of previous studies had been conducted to evaluate the role of immune response for the tumor development and progression. It had been proven that tumor-infiltrating lymphocytes (TILs) can be one of the important factors that impact the prognosis of malignancy.¹⁰ Stromal infiltration of TILs are evaluated more commonly in many malignant tumors, such as breast cancer, squamous cell carcinoma of the head and neck, ovarian cancer, prostatic adenocarcinoma, etc.⁹ A recommendation had been proposed to evaluate the TILs infiltration in breast cancer by the International TILs Working Group and stromal TILs are suggested to be evaluated for this purpose.²³ In the previous study about TILs in cSCC, stromal TILs had been proven to have a strong correlation with the histological grading of cSCC.¹¹

TILs are actually composed of many subsets, such as CD4+, CD8+, FoxP3+ T cells, $\alpha\beta$ T cells, $\gamma\delta$ T cells, B cells, natural killer cells, and natural killer T cells.¹²⁻¹³ Each subset plays its role in the tumor immunity response. Although B cells are not the major component of TILs, B cells are believed to have a significant role in the immune response because of their ability in producing the humoral antibodies, facilitating the response of T cells, presenting the antigen, and also their direct cytotoxicity capabilities against the tumor cells.^{17,24} Studies about the tumor infiltrating B cells (TiBC) had been done for malignancies in many organs, such as the non-small cell lung carcinoma, prostatic adenocarcinoma, ovarian cancer, colorectal carcinoma, uterine cervix cancer, and also breast cancer.¹⁶ Garaud, *et al.* had concluded that the higher density of B cells infiltration in the triple negative breast cancer and HER-2 enriched breast cancer has a correlation with the better outcomes.²⁵ Mullins, *et al.* did not evaluate the density level of B cells infiltration in colorectal carcinoma, but they focused to study about the ability of B cells in presenting the tumor antigen and secreting the immunoglobulin A, G, and M.²⁶

B cells, together with the T cells, will form the TILs aggregation which is best known as tertiary lymphoid structures (TLS). B cells can be evaluated from their surface molecule expression and many studies had used CD20 because CD20 is expressed in every stage of B cell differentiation, except the plasma cells.¹⁷⁻¹⁸ The correlation of the immunohistochemical expression of CD20 and the TILs infiltration, including the intratumoral and stromal infiltration, did not show the statistical correlation based on the Kruskal-Wallis statistical analysis method. Probably, this is due to the composition of cutaneous immune cells types and their ways of migration. CD8+ T cells are more commonly found at the epidermis, while the CD4+ T cells are found mostly at the dermis. The CD4+ T cells and CD8+ T cells will circulate continuously between the skin and the draining lymph node and play an important role in detecting the tumor cells. The migration of the CD8+ T cells are mostly determined by CCL27, a chemokine produced by the keratinocytes. The homing of T cells at the skin is generally determined by the memory cells which express CD45RO+. The memory cells which express these surface molecules are the memory T cell. This indicates that the migration pattern and homing of T cells at the skin are determined by the previous antigen at the same tissue.²⁷ The presentation of tumor antigen to the T cell lymphocytes can be conducted by the dendritic cells and also the B cells. The dendritic cells only initiate the immune response, while the B cells can give persistent stimulation and can recognize the specific antigen even in the low concentration of the antigen, therefore the antigen can be presented to the T cell persistently and the anergy of T cells can be avoided.²⁸ B cells also induce the proliferation of T cell. However, normally, the B cells are only found in a very small proportion at the skin and also at TILs component.^{17,29} The migration of the B cells to the skin includes many important stages. After produced at the bone marrow, B cells will migrate to the secondary lymphoid organs, such as spleen, peripheral lymph nodes, lymphoid tissues of the gastrointestinal tract and also the mesenteric lymph nodes. At the secondary lymphoid organs, the maturation and differentiation of B cells to become the immunocompetent of effector cells are occurred. Then the mature B cells will circulate to the peripheral tissues. The migration is controlled by a lot of interaction between the unique combination of specific adhesion molecules (selectin and integrin) with the chemokines and their receptors. Nevertheless, these processes are particularly occurred at the gastrointestinal tracts, while the mechanism of migration and recruitment of B cells to the skin have yet been understood. Recent finding showed that the chemokines for homing system of T cells are also identified at the B cells. The exact signaling for the last stage of the lymphocyte trafficking involves the transmigration of cells across the vascular endothelia, which may include ICAM-1, vascular cell adhesion molecule (VCAM)-1, and CD47, but they are still being investigated.²⁹

The formation of tertiary lymphoid structure (TLS), which had been categorized as score 3 of TILs infiltration in this study actually involves many types of cells, such as lymphoid tissue-inducer cells, stromal cells, dendritic cells, B cells, and also the subpopulation of T cells.³⁰⁻³¹ In the pathological condition, the reactive stromal cells will produce signaling matrix to induce the specific tissue to overexpress lots of inflammatory mediators, such as CCL21 and CXCL13 and also recruit the leucocyte to the

local lesion to form the TLS. TLS is a tertiary lymphoid structure, formed by the lymphocyte aggregation which is located ectopically at non-lymphoid organs. TLS contain of B cells, dendritic cells, CD4+ T cells, and also CD8+ T cells. TLS plays an important role in the recruitment, activation and proliferation of B cells and T cells.³¹⁻³² Recent studies had shown that TLS increase the lymphocytes recruitment by expressing CXCL10, CXCL12, CXCL13, CCL19, and CCL21. Transforming growth factor- β can increase the ability of CD8+ T cells at the peripheral circulation to recruit B cells to the tumor mass by expressing CD103 and secreting CXCL13. Inhibition of TGF- β will stop the production of CXCL13 and downregulate the recruitment of B cells, These indicate that the activation of CXCL13, CD103, and CD8+ T cells are closely related to the recruitment of B cells and the TLS formation.³¹

The histological grading of cSCC is based on the degree of anaplasia in the tumor nests, mitotic activities, and the keratin formation. Tumors with high proliferation usually show higher histological grading.⁷ Control of tumor development is affected by the the ability of immune respon to recognize and eliminate the tumor cells. Interaction of various immune cells at the tumor microenvironment can cause the antitumorigenic or protumorigenic effects.¹²⁻¹³ Statistical analysis with Kruskal-Wallis method to evaluate the correlation of immunohistochemical expression of CD20 with the histological grading of cSCC showed that there was a tendency of correlation between them, although it was not statistically significant. This is probably due to the dual role of B cells in tumor immunity, to inhibit the tumor progression and also tu increase the proliferation of tumor cells.^{31,33}

Inhibition of tumor growth is related with the ability of tumor-infiltrating B cells (TiBC) in producing antibodies, forming the antigen-antibody complex, presenting the tumor antigen, and secreting the cytokines in order to eradicate the tumor cells or to influence the function of immune cells in the microenvironment of tumor. If the tumor growth can be inhibited, then the diffentiation of tumor will be better.^{31,34}

Production of antibodies is the important way of B cells to show the antitumor immune response. Studies had concluded that B cells could neutralize the antibodies, prepare antibodies, and form the antibody-antigen complex. A research showed that TiBC can be activated by MCA205 tumor cells. After being activated, TiBC will produce IgG2b antibodies which will specifically bind the tumor cells and produce the antitumorigenic effect. The research also indicated that TiBC would eradicate the tumor cells which were wrapped in the IgG through the antibody-dependent cell-mediated cytotoxicity or dissolve the tumor cells by the antibody-mediated activation of the complement system.³¹

Activated B cells also have main function as antigen presenting cells (APC). Various studies had shown that costimulatory molecules, chemokines, and adhesion molecules at the surface of B cells are highly expressed under the influence of antigen receptors, lipopolysaccharides, and CD40 ligand, thus increase the ability of B cells as APC. Activated B cells by CD40 ligand can express chemokines and costimulatory factors, such as CCL2, CXCR4, CCL5, CXCL5, and CXCL10 and induce antigen-specific CD8+ T cells and CD4+ T cells to produce antitumor immune response. TiBC also present antigen even in the low concentration of antigen for a long period. This is very

important for the persistency and proliferation of tumor-infiltrating T cells and the antitumor immune effects.³¹ Tumor-infiltrating T cells consist of many subsets. At the epidermis, the most common T cells are CD8+ T cells which have a strong relationship with the better prognosis and survival for patients with malignant tumors. Besides that, the high level of CD8+ T cells also can be found at the tumor with less aggressivity or tumor with better differentiation.^{8,27}

B cells also secrete many cytokines to regulate the tumor immunity. Be-1 cells, which are initiated by T helper1 cells (Th1 cells) and antigen, will produce the cytokines, such as IFN- γ , TNF- α , and IL-12. The Be-2 cells, which are initiated by Th2 cells, will produce IL-2, IL-13, TNF- α , IL-6, and IL-4.^{31,35} These cytokines play important roles in antitumor immune responses. Studies had shown that IL-12 will induce the production of various other cytokines, such as IFN-1 and also increase the proliferation and antitumorigenic effects of T lymphocytes and NK cells. TiBC also interact with the microenvironment of tumors and play their roles. The most important interaction in tumor immunity can be seen in the interaction of B cells and T cell, which can form the TLS. The density of TiBC (evaluated from the immunohistochemical expression of CD20) is also related with the expression of granzyme B and IFN-1, which are the markers for activation of the cytotoxicity of T cells and NK cells. Therefore, the density of TiBC is actually related with the activation of CD8+ T cells and CD56+ NK cells in the microenvironment of tumor.^{31,36}

B cells also have negative effects for antitumor immune response. The B reg cells, a subset of the TiBC, play important roles in the development and progression of tumor growth.^{31,33,36} Tumor cells and IL-21 induced granzyme B expressing B reg cells will interact with the tumor cells and increase the ability of immune escape of the tumor cells. B reg will produce TGF- β , which will influence the epithelial-mesenchymal transition (EMT) at the tumor tissue.^{31,37} Besides the TGF- β , B-reg cells also produce IL-10 and IL-35. Breg secreting IL-10, also known as B10, will increase the changes of Th0 cells to Th1 cells or Th2 cells, thus inhibit the proliferation and activation of T cells. Moreover, there are also increases of expression for FoxP3 and CTLA4 of T reg cells, which act as the tumor suppressor marker. B reg cells are also able to increase the transformation of CD4+ T cells to FoxP3 T reg and T reg secreting IL-10. Studies had shown that the loss of IL-35 secretion by B reg and T reg cells can increase the activation of macrophage and T cells, and also increase the ability of B cells as APC. B reg cells can also dismiss the toxic effect of NK cells by secreting IL-10. The main transcription factor of IL-10 is STAT3. By the activation of STAT3, B reg cells can inhibit the tumor immunity response and fasten the tumor growth.³¹

This was a retrospective study with some limitation. The samples used in this study derived from the tumor biopsy and tumor mass excision. Although the specimen contained enough tumor cells and stroma for evaluation of TiBCs, the presence of B cell in normal skin should be considered. Normally, B cells can be found in the dermal layer which probably cannot be obtained optimally from tumor biopsy. The density of TiBC itself is correlated with the activation of CD8+ T cells and CD56+ NK cells at the microenvironment of tumor. The interaction between the CD8+ T cells and the B cells had been proven to increase a

better outcome for some malignant tumors. It should be evaluate too in cSCC. Besides that, this study did not evaluate the the protumorigenic effect of the specific subset of B cells. These limitations will give further consideration in future studies.

V. CONCLUSION

After conducted this study, we conclude some points in the following:

1. The biopsy specimen of cSCC should reach the midreticular dermis for the better evaluation of tumor-infiltrating lymphocytes, especially for the B cells.
2. There is no statistical correlation between the immunohistochemical expression of CD20 with the level of intratumoral and stromal TILs at cSCC.
3. CD20 expression tends to have correlation with the histological grading of cSCC although it is not significant statistically.

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Table 1. Distribution of cutaneous squamous cell carcinoma based on the histological grading, level of tumor-infiltrating lymphocytes, and the immunohistochemical expression of CD20

Variable	Total (n)	Percentage (%)
Histological Grading		
• Well differentiated	19	42.2
• Moderately differentiated	16	35.56
• Poorly differentiated	10	22.22
Level of intratumoral TILs		
• None	0	0
• Minimal infiltration	13	28.88
• Moderate infiltration	25	55.56
• Massive infiltration	7	15.56
Level of stromal TILs		
• None	0	0
• Minimal infiltration	3	6.67
• Moderate infiltration	16	35.55
• Massive infiltration	26	57.78
Immunohistochemical expression of CD20		
• None	10	22.22
• Scattered cells without dense infiltrates	29	64.45
• Dense infiltration with tertiary lymphoid formation (TLS)	6	13.33
Total	45	

Table 2. Correlation of immunohistochemical expression of CD20 and the level of intratumoral TILs

Variable	Level of Intratumoral TILs								Total	p-value
	Score 0		Score 1		Score 2		Score 3			
	n	%	N	%	N	%	N	%		
Immunohistochemical expression of CD20										
• No expression	0	0	3	30	7	70	0	0	10	0,479
• Scattered cell without dense infiltration	0	0	8	27.7	17	58.6	4	13.8	29	
• Dense infiltration with formation of TLS	0	0	2	33.3	1	16.7	3	50.0	6	
Total	-	-	13		25		7		45	

Table 3. Correlation of immunohistochemical expression of CD20 and the level of stromal TILs

Variable	Level of Stromal TILs								Total	p-value
	Score 0		Score 1		Score 2		Score 3			
	n	%	N	%	N	%	n	%		
Immunohistochemical expression of CD20										
• No expression	0	0	0	0	4	40	6	60.0	10	0.904
• Scattered cell without dense infiltration	0	0	2	6.9	11	37.9	16	55.2	29	
• Dense infiltration with formation of TLS	0	0	1	16.7	1	16.7	4	66.6	6	
Total	-	-	3		16		26		45	

Table 4. Correlation of immunohistochemical expression of CD20 and the histological grading of cutaneous squamous cell carcinoma.

Variable	Histological Grading						Total	p-value
	Well differentiated		Moderately differentiated		Poorly differentiated			
	N	%	n	%	N	%		
Immunohistochemical expression of CD20								
• No expression	6	60	4	40	0	0	10	0.091
• Scattered cell without dense infiltration	10	34.5	9	31.0	10	34.5	29	
• Dense infiltration with formation of TLS	3	50.0	3	50.0	0	0	6	
Total	19	-	16		16		45	

Language Acquisition Patterns of a Bilingual Child: A Psycholinguistic Approach

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Abstract: The aim of this study is to explore the extent to which the bilingual acquisition research plays a major part in bilingual acquisition theories. This study reports the language development of a bilingual child from a Tamil and English language speaking home from the first vocal sound to the holophrastic stage. It elaborates how in each stage the child develops her bilinguality in both comprehension and production. The study was carried out by maintaining the proper records of the child's utterances in the form of 'diary' and digital recording and the traditional method of phonetic transcription was used to record utterances. The research method applied in this study is longitudinal and naturalistic observational sampling in nature, as most of the early bilingual researchers apply. The results of this study reveals contrary to the myth in bilingual language acquisition both the skills of comprehension and production in one language is always dominant, parallel and equal than the other language at a given time. This study falsifies the myth the comprehension skill is more dominant in one language (English) than the other language (Tamil), and at the same time production is vice versa (more dominant in Tamil than English). This case study reveals that the skills of comprehension and production are not language oriented but the accessibility of child, based on language choice.

Index Terms—language acquisition, bilingual acquisition, language development, holophrase

1 Introduction

Language acquisition is the study of the development of a person's language, refers to the way people learn their native, first, second or other languages. More specifically, it may refer to the time a language feature has been acquired. This may vary from the first emergence or onset of a language item to the time of its accurate use. As a field of study, it is the subject of linguistics, psychology, and applied linguistics. Its objects is to study (1) how languages are learned, (2) what are the development stages in this process, and (3) what is the nature of language. To find answers to these questions, researchers apply longitudinal and cross sectional methods. In the first of these they study the specific development in the language of individuals and group over a period of time. In the second they research a particular feature in the language of a group at a given point in time.

1.1 First language acquisition

First language acquisition is the child's learning of his or her first or native language. Traditionally and especially in monolingual societies, the first and native language were used synonymously. With the expansion of cross-cultural communication the two terms become more distinct. Children may acquire some knowledge of another language from a nurse or a relative before they acquire their native language, e.g. the language of the country they live in. Thus, a Chinese child born in the United States may first learn Chinese

from his or her parents, and learn English later from English speaking children and adults. To avoid the confusion arising from the use of 'first' and 'native', another term, 'primary' is sometimes used to indicate a child's first language chronologically.

1.1.1 First Language Acquisition and the Language Acquisition device

Noam Chomsky's work aroused interest in the way the children learn their first language. He believes that children are born with the ability to learn a language, i.e. they are born with a 'language acquisition device'. The latter is species-specific/only for human, language specific /only for their first or native language, and innate/only inborn. He also claims that this ability is unconscious and children learn their native language by exposure to it and by using it, and not by being taught or corrected. He argues that as children acquire their native language, they are able to produce sentences that they have never heard before.

1.2. Bilingual Acquisition

Bilingual first language acquisition is defined as the parallel acquisition of two languages, which is, supposedly evenly paced process. Children growing up exposed to two or more languages acquire each of them in much the same way as monolinguals. Bilingual acquisition during childhood can thus be regarded as an instance of simultaneous acquisition of two 'first' languages. In fact, if children are exposed to more than two languages simultaneously, they are able to acquire full competence of each that does not substantially differ from the speaking ability of monolinguals; bilingualism is therefore a special case of multilingualism.

Comparison with monolinguals is one of the main issues in research on bilingual acquisition. It can be extended to all types of acquisition where more than one language is learned, independently of age of onset and proficiency attained in each language. The present research, however, is limited to child bilingualism. Whether types of bilingual acquisition should, in fact be distinguished according to the age of onset of learning ('bilingualism' vs 'foreign language learning') depends ultimately on the results obtained in these comparisons. Given our current state of knowledge, it is plausible to assume that age of onset is a crucial factor causing fundamental differences between child and adult language acquisition. Consequently, it is necessary to distinguish between simultaneous and successive acquisition of bilingualism. 'Simultaneous' acquisition does not necessarily imply that the child has been exposed to both languages from birth, although this interpretation has occasionally been suggested. The controversial issue here is the age range during which changes occur, which result in qualitative differences between first and second language acquisition. Although sufficient evidence is not yet available, the period around three years of age appears to be of particular significance. The most widely accepted view is that one may qualify as 'simultaneous' those instances of bilingual acquisition where the child is exposed to two languages before the age of three. In this case, each language of the bilingual is predicted to share crucial similarities with that of the respective monolingual speakers but to exhibit differences in comparison with languages learned at the later age.

2. Literature Review

Studies on language acquisition began at the end of nineteenth century and those who carried out these studies were mostly parents observing the language development of their children maintaining 'diaries' of their utterances. In the meantime psychologists, showed their interest in the study of the process of language acquisition. A psychologist studies the phenomenon of language acquisition as part of their investigation of the child's total growth and development. Language is considered by many of the psychologists as an important model of behavior and they feel that "the study of the process whereby children learn to speak and understand language holds the key to many fundamental problems of behavior" (Carroll 1986). The acquisition of language by children has also attracted the attention of linguists and psychologists who have made great contribution to the field.

Fortunately, a very large body of literature is found on language acquisition or child language right from the period of 'parental diaries' to the present time.

After Werner Leopold's assertion in the late 1940s that 'child language and infant bilingualism have so far only received marginal consideration from most linguistic scholars' (Leopold 1948), there was, initially a slow but steady growth in research on child language. Since the cognitive revolution of the 1960's an explosion of research on child language acquisition has taken place. However, in this growth, research on bilingual children has taken a back seat to the study of monolingual children. Romaine (1989) and many others have observed that the research on child language is predominantly devoted to the monolingual child and that too, to English. This neglect of bilingual children is readily evident just from the sheer number of studies devoted to this topic in comparison with those of monolingual children. One estimate is that out of about six hundred studies devoted to the child language acquisition, only about ten works deal systematically with the bilingual child.

There are number of reasons for this neglect, but the following two are noteworthy: first, the view has predominated that the phenomena of bilingualism are, in general, highly complex and therefore the study await the satisfactory development of a theory of monolingual language acquisition. In other words, a better understanding of monolingualism is the key to an understanding of bilingualism in general, and the bilingual child in particular. Second, there are fundamental conceptual problems with bilingualism including the definition and measurement of the phenomenon. Therefore, as the argument goes, it is not wise to invest time and energy in the study of the bilingual child. In spite of these apparent obstacles, there is currently a renewed interest in childhood bilingualism. The main reasons for this new and encouraging development fall into two categories; theoretical and applied. As regard the theoretical reasons, the interest in the theory of grammars in contact and in universal grammar have grown rapidly in recent times, thus changing the nature of research on childhood bilingualism which was predominantly descriptive as recently as the early 1990's. Applied reasons deal mostly with the effects of bilingualism on language development, socio political aspects of educational practices and changing perspective on global and minority communities.

The most important and the most aged early study of bilingual language acquisition is the detailed work by Leopold (1939-49), a German linguist living in the United States, consisting of four volumes. It is the study of the speech development of Leopold's own daughter Hildegard from her birth to the age for two years. Hildegard was acquiring both English and German simultaneously; Leopold's work mostly deals with Hildegard's acquisition of English.

Meisel (1992) presented his findings from a longitudinal study of two children. Both children were learning French and German growing up in middle class families in Humburg, Germany, at the time of the study. The study focuses on their speech patterns during the early period of acquisition (1.4 to 3.0). The male subject appears to be French dominant initially, whereas the female subject was to begin with balance language input from the French and German. However, after, the age 2.6 German began to be dominant in her case.

Early researchers assumed that very young bilinguals had a single abstract system joining their two languages. But an in-depth study in 1990 of a Dutch English bilingual child provided evidence such children develop two systems. This study by De Huwer showed that children regularly exposed to two languages from birth according to the 'one parent, one language principle develop two morpho-syntactic systems'. Also her study showed that the grammatical development of one language does not have any fundamental effect on the development of the other. That is, once children are at the one word stage and beyond, research shows they have two systems, not one.

Until this time opinion followed by Volterra and Taescher (1978) and others claim that the child has a three stage model of acquisition, moving from one lexical system, to two such system but one set of syntactic rules, to finally two separate languages. Researchers spoke of 'fusion' of the child's two grammatical systems. But, as De Huwer (2005) points out, the 'fusion' or 'hybrid' did not offer an explanation of how children eventually manage to differentiate their languages. Those researchers who argue that the child's two language systems are fused have to come up with an explanation for how they eventually become divided.

As the 1990's began, a number of studies had just appeared or were appearing with extensive data supporting De Huwer's research (e.g. Deuchar and Quay 2001; Genesee et.al.1995; Lanza 1997; Meisel 1989). Her separate Development Hypothesis basically states that very young bilinguals employ two separate grammatical systems, one for each language, when they speak their two languages.

Studies show many differences in how the young simultaneous bilingual uses his or her two languages. At one extreme, child may use language A for many multi clause utterances and use language B only for single words. Other children do a good deal of code switching. Studies are mixed in regard to how much parents or caretakers input seem to influence children in their preference for one language. The case study of Siri, a child being raised in Norway as Norwegian – English bilingual, is an example of studies that support the notion of switching languages is not just a matter of filling lexical gaps. Lanza (1997) argues that not just parental language choices matter, but also their discourse strategies matter, too. Lanza studied Siri from about the age of one year, 11 months to two years 7 months. The American mother and Norwegian father claimed to practice 'one language, one parent', although the father had spoken English to the child up to age 10 months. Overall, Siri received more outside exposure to Norwegian than English. Her mother was her only regular source of English and she was exposed to her mother's bilingual identity, because when they went for shopping, mother spoke Norwegian.

While Siri produces English content words with either English or Norwegian grammatical elements, she only produces Norwegian content words with Norwegian grammatical elements. Lanza states that this indicates the prevalence of a Norwegian grammatical frame. Siri's discourse style included a good deal of switching while her parents maintained their 'one language one parent style'.

Another study that seems to show the effects of parental input dealt with four Japanese English preschool bilingual boys whose production of the minority language (Japanese) increased (Kasuya 1998). The children were raised with the 'one parent, one language' pattern but they lived in an environment in which they were exposed to English more than Japanese (they were raised in the United States).In fact, generally they were exposed to Japanese only at home still the parents wanted the children to retain Japanese, so the parents always spoke Japanese to the children, even though the parents were bilingual.

Three results from this study about the effect of parental language choice are noteworthy. First there was a relation between what the parent spoke to the child and the language in which they responded. Second the children whose overall use of Japanese during the course of study come from the families in which the parents used the most Japanese to the children. Third, the child who got the least Japanese in both absolute relative terms was showing the lowest relative use of Japanese compared to the other children.

The findings of several diary studies and other studies of bilingual child language acquisition e.g. (Burling 1959; Leopold 1939-1949) and other reveal that with a change in input conditions, bilingual children can retrieve one language and fail to retrieve another in terms of at least linguistic performance i.e. they can either ' turn off' or ' turn on' one of their language. If the conditions for turning on of one language and turning off of the other are prolonged, one language may progress and the other language may regress or delay to the extent that the child might experience total language loss at least at the performance level.

3. Present Study

3.1 Aim of the present study

The present study aims to investigate the language acquisition patterns of a bilingual child from birth to 1.6 years

3.1.1 Methodology

The present study follows a longitudinal research method i.e. the data was collected on a regular schedule at predetermined times according to the stages in acquisition process. From birth onwards the child was observed by the researcher and the language data / samples were recorded by keeping a written diary and a tape recorded forms.

As for the data collection, systematic diary of the child language acquisition was maintained. Since her birth regular tape recordings were also made on child's spontaneous speech from the time of her first word. The recordings were made at regular intervals. The average duration of the recording was 10 minutes. Details concerning the speech context, interlocutors, child's gestures and pointing were noted down as carefully as possible for each utterance spoken by the child.

Besides collecting such samples of spontaneous speech, data were also elicited. Such elicitations were made possible by encouraging the child to respond to particular stimuli by naming, pointing, and answering questions etc. All such data were phonemically transcribed and analyzed.

4. Data analysis and discussion

Nothing can make a parent prouder than a child's first word. We all recognize the first word as a major milestone in the child's development, a clear token of the child's entrance into a fuller membership in human society.

For many parents, a child's first words, uttered around 1 year of age, mark the first real evidence of language development; the child has 'started to talk'. But this is to ignore a great deal of early progress during the first year, without which no first word would emerge at all. Between birth and 12 months, a vast change takes place in a baby's sound producing abilities, and several stages of development have been proposed.

The study reported in the following sections traces the language development of the child from a Tamil and English speaking home, from the first vocal sound and to the holophrastic stage. The child's bilinguality was consciously helped on the "mixed language principle" according to which parents spoke to the child in both languages. Her grandmother and aunt who spent most of the time with her had spoken in both languages. The other caretakers and neighbors spoke to her in Tamil only. The child had an opportunity to spend a considerable time playing with her Tamil and English speaking friends in the apartment.

Right from the very beginning i.e. since her birth, the study was carried out by maintaining the proper record of her utterances in the form of a 'diary; and tape record and the traditional method of phonemic transcription was used to record utterances.

4.1. Early Vocalizations

4.1.1. Stage I: Basic Biological Noises

The first vocal response Madhu made was, like other infants, her “birth cry”. A baby’s vocal sounds, over the first few weeks of life, reflect its biological stage and activities. The reflexive noises of crying and fussing reflects the stages of hunger, pain, thirst, or discomfort. A wide range of vegetative noises, such as sucking, swallowing, coughing, and burping also appears in this stage. Although, her crying was simple monotonous response, through this she had established a contact with the people around her. After a couple of months she developed ‘cooing’

4.1.2. Stage II: Cooing and Laughing

Between 6 and 8 weeks, the first cooing sounds are produced generally when the baby is in a settled state. It refers to the production of non-crying sounds. These sounds develop alongside crying, gradually becoming more varied, as the child responds to the mother’s smile and speech. They are quieter, lower pitched and more musical than crying, usually consisting of a short vowel like sound preceded by a consonant like sound. Many have nasal quality.

During the period, madhu’s vocalizations mainly consisted of the following;

- i. Non-nasalized short vowel sounds .such as a, u, e, i
- ii. Nasalized long vowels, such as ã:, ã:, ē:, ũ:
- iii. Short vowels /a/ and /u/ combined with /m/ or /mm/ such as ‘am’, ‘amm’, ‘um’, or ‘umm’ with continuous flow of air stream through the nasal cavity.

4.1.3. Stage III: Vocal Play

The sounds appear in this period are much steadier and longer than those of cooing. Most segments consist of consonant plus vowel like sequences, which are frequently repeated, prolonged over one second. Usually they are high pitched and involve wide glides from high to low. A considerable range of consonants and vowel qualities is apparent including nasal and fricative sounds. Individual differences are there, in the order of emergence of these sounds. Several changes are also noticeable during this period. On some days nasal sounds may be dominant sounds; on other days it may be labial. In due course, the sounds combine into longer sequences to produce the first babbling sounds.

4.1.4 Stage IV: Babbling

In the early part of this period, babbling is not much varied of vocal play. A smaller set of sounds is used with greater frequency and stability, to produce sequences known as reduplicated babbling. The consonant which Madu produced first is /m/ the bilabial nasal, then occurred another consonant /t/. The consonants /m/ and /t/ were uttered forming syllables, such as “ma”, “ba”, “mama”, “tata”. Sometimes same syllable was repeated many a times to produce reduplicated sounds such as “mamamama or tatatata etc. The other consonants she uttered during the babbling period were /n/, /p/, /b/, /d/ /g/, /k/. She had developed the habit of repeating these sounds in reduplicating patterns like “nana”, “papa”, “baba”, “dede”, “dada”.

About half way through the period, this developed into variegated babbling, in which consonants and vowels change from one syllable to the next such as “ada”, “ida”, “iba”, “ipa”. The rhythm of the utterances and the syllable length at this point are much closer to that found in speech.

It was found that her babbling sounds were remarkably distinguished from the random vocalizations of early period and it was very easy to segment them into pieces consisting of syllables. It was also found that though babbled utterances seems to have no meaning, and serve no communicative function, but some resembled her first meaningful words of the holophrastic stage. It is an evidence to show that there is ‘continuity’ between the child’s babbling and later speech (Clark and Clark 1977).

At this stage of language acquisition, the child was imagined to be trying out every possible sound in a random manner and that babbling would stop before speech began. Recent studies have shown that this view does not hold. In many cases, babbling continues long after speech begins, sometimes as late as 18 months. In Madhu’s case also it is proved that she continues to babble like “blablablaba” at the month of 14.

Janda and Hamel (1982) however regard babbling as “necessary step in language development”. David Ingram (1989) is of view that babbling occurs because the child is innately disposed or programmed to babble. According to him “there are two inner drives behind babbling, one the drive is to express oneself, the other drive is to socialize with others”.

The brain seems to be controlling the development of babbling and early speech in a similar way, so that a set of well-practiced sounds is available for use at the time when children become intellectually capable of using sound for the communication of meaning.

Table 1 Madhu’s early vocalization

Period	Sound Uttered	Utterances
Crying	Comfort and discomfort sounds	
Cooing	<p>Vowels: a, i, u (short) ū:, ē:, ā:, î: (long)</p> <p>Consonants: m (occurring only with a preceding vowel)</p>	<p>a) ū:, ē:, ā:, î: (all nasalized and lengthened)</p> <p>b) “am”, “um”, “umm” (with continuous flow of the air stream through the nasal cavity)</p>
Babbling	<p>Vowels: a, e, i, u</p> <p>Consonants: m, p, b (bilabial) n, t, d (alveolar) k, g (velar)</p>	<p>Stage I</p> <p>a) “ma”, “mama”, “mamamama”, “mamamamama” etc.</p> <p>b) “ta”, “tata”, “tatata” “tatatarata” etc</p> <p>c) “ba”, “kaka”, “nana” etc. (reduplicated syllables)</p>

		<p>Stage II “iba”, “ida”, “ita”. (using consonants inter-vocally)</p> <p>Stage III “ka”, “ga”, etc.</p>
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4.1.5 Stage V: Single or One Word/ Holophrastic

The period between twelve and sixteen months during which children normally begin to comprehend words and produce single unit utterances, is usually referred to as one word stage. Benedict (1979) shows that the gap between comprehension and production is usually very great at this time, a child may be able to understand about a hundred words before it begins to produce words. At this stage, the child’s utterances do not show any structural properties, and their meanings appear to be primarily functional.

At around 16-18 months, single word utterances seem to begin to reflect semantic categories such as Agent Action and Objects (Ingram 1989) though it is difficult to assign precise adult meaning to the child’s utterances even though the non-linguistic context often helps. For instance while adult may interpret /nanni/ ‘water’ to mean ‘it is water’ or ‘I want water’ or ‘give me water’. It is questionable whether it is justifiable to assign such translations; how can we know whether the child has the exact concepts which the adult interpretations imply? What does seem obvious however is that the child at this stage is doing more than just naming the objects, actions etc. Therefore many researchers prefer to call this stage as holophrastic stage.

The term “holophrastic” comes from the “holophrase” which is defined as follows “when a single word stands for a phrase or sentence, it is referred to as holophrase (Jinda and Hamel 1982). A holophrase (holo which means complete) is a one word utterance which is used to give the complete sense of a sentence.

Many children at the one word and holophrastic stages have a tendency towards over extension: having learnt, perhaps, the word *ball* to refer to a ball, the child may use ball to refer to other round objects (Braun Wald, 1978). The range of reference of a child’s word is called its associative complex and it is usually determined by such perceptual features as shape, size, sound, movement, taste, and texture (E.Clark 1973). It is likely that a child overextends because it’s vocabulary is limited, i.e. if it is presented with a new object it will refer to it by a word it already known for something which resembles a new object, just as adults tend to do (Ingram, 1989). Some over extension is exclusively productive, i.e. a child may be able to pick out the appropriate object in response to motor cycle, bike, truck, and plane but refer to them all as car in production (Rescorla 1980). This may be because the child has difficulty in retrieving the correct word (Chapman 1977; Rescorla 1980).

In case of Madhu, holophrastic speech occurred sometime around the age of 10 months and the meaningful word she first uttered was “amma” (mother). The next word Madhu uttered was ma:ma (uncle). This was actually the combination of two syllables ma+ma lengthening the vowel in the first syllable. The only addition made was the lengthening. Otherwise this utterance had been babbled around the sixth month of her age. Some other words Madhu uttered were “ nanni” (water), “mi:/mi:ya” (fish), “pu:si” (powder/cream), “baba” (baby), “ta:tta” (grandfather), “da:da” (dog) “ba:” (come), ko: (crow), “bo” (ball), “do” (doll), “ba:y” (bye bye), “ki:” (key), “alla” (hello/phone) “pu:” (flower) “ma:mi” (god), “mu:” (moon), “pappu” (milk), “ka:y” (leg), “ka:” (car), etc. These words represented food items, household objects, birds, toys, kinship terms and actions.

Some of these words are constantly repeated by her mother, the caretakers, and the people around her in specific contents and meaningfully imitated by the child. These are characterized by two types of linguistic peculiarities.

1. They are mainly composed of plosives and nasals
2. They begin with consonants and end with vowels except “amma”

5. Findings and Discussions

A close study of the recorded vocabulary items (sample of data) in different ages reveals the following facts

1. The following new consonants and vowels added for both English and Tamil to her repertoire of sounds
 - a. Consonants tʃ, n, v, x
 - b. Vowel: /æ/, /o/
2. Words begin and end with vowels and consonants
3. The verbal forms also begin to appear
4. Consonantal germination also appeared
5. Adverb of negation also forms the part of vocabulary

The findings show substantial increase in the vocabulary of the child from the age of 1.0 in both languages. The findings also show that it is not only that comprehension precedes production but there are also substantial difference between comprehension and production. The most widely accepted assumption that children comprehend language more than they produce it.

In this case study, it was observed that responses to gestures and response to saying goodbye occurred at the age of 0.9, but she didn't utter her first word until she was 10 months of age. Many studies of language development mentioned by Mc Cathy (1946) suggest that a child's first word appears at about one year of age.

Table 2 Madhu's Tamil Vocabulary at Different Age Periods

Age	Production Number of words	Comprehension Number of words
0.8	0	4
0.9	0	5
0.10	2	7
1.0	6	12
1.1	9	15
1.3	11	28
1.6	21	37

Table 2 Madhu's English vocabulary at different age periods

Age	Production Number of words	Comprehension Number of words
0.8	0	8

0.9	0	13
0.10	2	18
1.0	3	25
1.1	7	40
1.3	10	51
1.6	17	96

6. Conclusion

The results of this study reveals contrary to the myth in bilingual language acquisition both the skills of comprehension and production in one language is always dominant, parallel and equal than the other language at a given time. This study falsify the myth the comprehension skill is more dominant in one language (English) than the other language (Tamil), and at the same time production is more dominant in Tamil than English. This case study reveals that the skills of comprehension and production are not language oriented but the accessibility of child, based on language choice.

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The Two Sides of Covid-19 in Kenya: Getting A Closer Look

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Abstract- Coronavirus Disease (COVID-19) is an infectious respiratory disease which was first reported in Wuhan, China in December, 2019 and later spread to other countries. The alarming levels of spread and severity of the disease made the World Health Organization (WHO) declare the outbreak a global pandemic on March 11, 2020. By July 8, 2020, the disease had claimed 548,207 lives globally. The pandemic caused grief and suffering as the number of deaths increased every day. Kenya not being an exception, the government put up some measures in the attempt to contain the spread of the disease. These measures led to unprecedented challenges which included loss of livelihoods, disruption of the school calendar and human mortality through police brutality. On the other hand, as the country continues to contain the disease, several opportunities emerged. Such opportunities ranged from enhanced innovation to improved health facilities and personal hygiene. This paper, therefore, highlights on these two sides of COVID-19 in Kenya and the lessons learnt.

Index Terms- COVID-19, containment measures, Kenya, pandemic, socioeconomic

I. INTRODUCTION

Coronavirus Disease (COVID-19) is an infectious respiratory disease caused by a new strain of coronavirus. The first case of the disease was reported in Wuhan, China but later spread to 216 countries, areas or territories by July 8th 2020. It spreads by respiratory droplets released when someone with the virus coughs, sneezes or talks and the droplets inhaled or land in the mouth or nose of a person close by [1]. Thus, spread easily among people who are in close contact of about 2 meters. The disease, which majorly manifests itself through high fever, dry cough and tiredness, was declared a pandemic by the World Health Organization (WHO) in March 2020. As of July 8th 2020, data from Worldometer [2] indicated that over 12 million people had contracted the disease. Of the infected, 6,953,556 had recovered while 548,207 had succumbed to COVID-19 related complications.

The first case of Coronavirus Disease (COVID-19) in Kenya was reported on 13th March 2020. And as of July 6th 2020, out of 191,394 samples tested, 8067 people were confirmed positive of the COVID-19 out of which 164 had succumbed to the disease and 2,414 had recovered. Of the confirmed positive cases, about 88% were through local transmissions while 12% were from other

nationalities or Kenyan citizens who had previously travelled to countries affected with the disease. The steady rise in the number of new infections saw the government of Kenya impose some containment measures in a phased manner depending on the magnitude of the disease. Overall, the containment measures included dawn to dusk curfew (5 am – 7 pm), cessation of movement in and out of Nairobi, Mombasa and Mandera, wearing of face masks, closing of all learning institutions and public gatherings including places of worship. Other measures included reduction of the carrying capacity of public vehicles to 60%, ban of public air transport, ban of handshaking and mandatory installation of handwashing stands in all public places and regular hand washing or sanitizing. These measures precipitated myriad of socioeconomic challenges on one hand and some opportunities on the other. This paper highlights on the two sides of COVID-19 in Kenya.

II. METHODOLOGY

Mixed methods were used in obtaining data for this study. The methods used included: telephone and face-to-face interviews and literature review. The study was domiciled in Kenya.

III. THE SOCIOECONOMIC CHALLENGES OF COVID-19

A. Domestic Violence

With schools closed, 7 pm – 5 am curfew imposed, stay home orders and some employees sent home, the pandemic brought an environment of confinement, uncertainty, heightened levels of stress combined with the financial hardships. A study undertaken by the Ministry of Health and Population Council in April, 2020 revealed that 39% of women and 32% of men were experiencing tensions in their homes [3]. This stressful environment bred cases of domestic and sexual violence as well as violence against children in some families. Besides, removing children from a protective school environment heightened these risks. The National Council on Administration of Justice observed a sharp rise in sexual offences during the COVID-19 pandemic. Among all the crimes committed since COVID-19 was reported in Kenya, sexually related violence ranked third. A report by [4] indicates

that in the first three weeks of dusk to dawn curfew the number of calls regarding domestic violence increased by 34% (Figure 1).

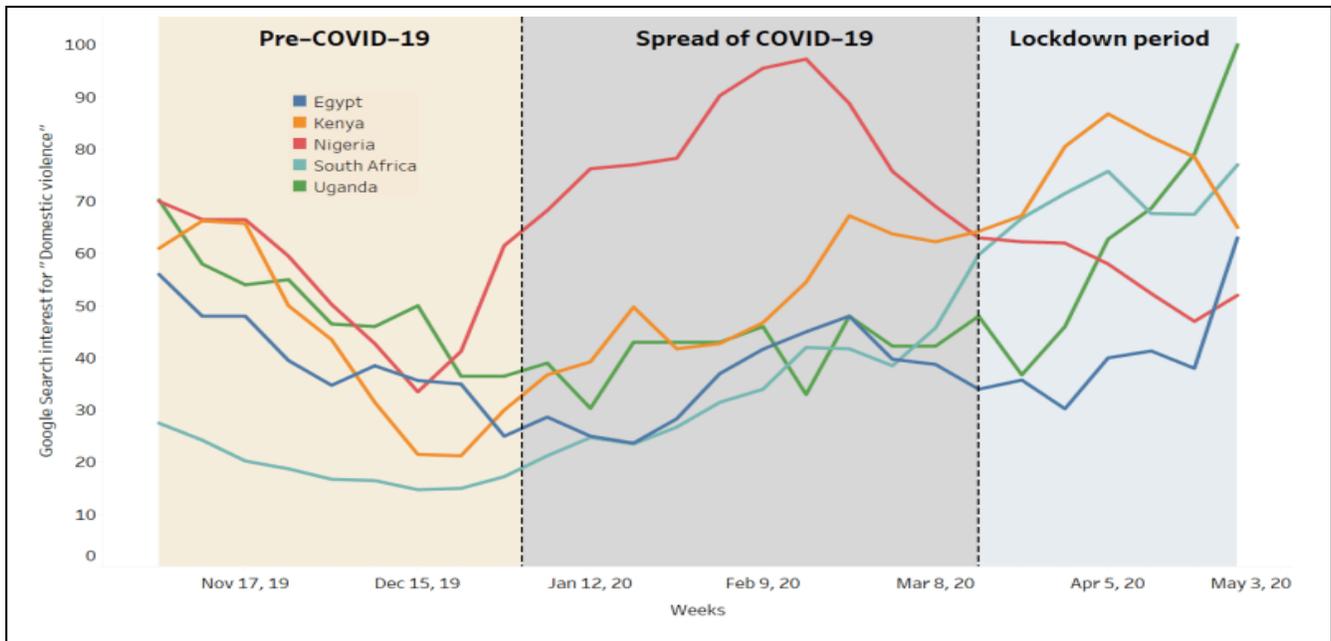


Figure 1: Domestic violence trends in different countries [5]

B. Financial Hardships

The economic hardships caused by the pandemic have caused treasury to set the economic growth rate to 2.5% from a previous forecast of 5.4 and is expected to decline to 1.0% if the impacts of COVID-19 on economic activities last longer. This will be occasioned by the anticipated 20% decline in tourism activities, 3.1% decline in total import value, 50% reductions in household and business spending, 30% disruption in the supply chain for key inputs in machinery and chemicals and a US\$ 658m deficit in revenue collection in April, May and June 2020 [4]. In the endeavour to cushion the country against the negative economic effects of COVID-19, the government imposed some tax interventions measures. The measures included a 100% tax relief for low-income-earning persons, a reduction in Pay-As-You-Earn (PAYE) rate from 30% to 25% for others, lower VAT and a corporate tax cut.

Most of the people employed in tourism and hospitality sector (which contributes to 8.5% of the total employment in Kenya) lost jobs or risked losing their jobs due to closure of hotels and shut-down of global aviation. For example, the Safari Hotel in Maasai Mara National Park sacked its employees. In the flower sector, about 30,000 temporary workers had been laid off and another 40,000 permanent staff sent on unpaid leave. The sector was losing approximately US\$ 2.5 million per day and had recorded more than 50% drop in exports. A survey by the Kenya National Bureau of Statistics (KNBS) in May 2020 revealed a decline in labour participation from 75% in 2019 to 56.8% in April 2020. In the transport sector, vehicles reduced their carrying capacity to 60% with buses plying in and out of Nairobi, Mombasa and Mandera

Counties halting their services due to lockdown in these counties. The suspension of international flights resulted in airlines sending home most of its workers on unpaid leave and pay cuts for the management team. These measures on transport led to a 51.7% increase in transport cost nationally forcing 32.2% of Kenyans to opt for walking where possible. These led to loss of livelihoods or reduced income both to service providers and owners of the vehicles. A survey by KNBS in May 2020 indicated that the population in active employment (both in formal and informal) declined from 77.6% to 65.3% and from 65.3% to 48.8% for men and women respectively [6]. Between March and May 2020, the effects of the pandemic had rendered about 133,657 Kenyans jobless.

C. Disruption of School Calendar

As one of the COVID-19 containment measure, all learning institutions in Kenya were closed on 15th March 2020. With the rising new cases of COVID-19 infections, the government proposed January 2021 as the tentative date of opening schools for basic education (primary and secondary schools). Thus, the year 2020 was declared a "lost academic year" due to COVID-19. Together with this, terminal examinations for primary school (the Kenya Primary Certificate Examinations) and secondary school (the Kenya Certificate of Secondary Examinations) were postponed to later date in 2021. For intermediate and tertiary education, a phased reopening was to commence in September 2020 after the institutions meet the laid down containment measures by the ministry of health.

D. Police Brutality

In enforcing the dusk to dawn curfew as a COVID-19 containment measure, the police used excessive force on non-compliant citizens (Figure 2). Report from IPOA of June 2nd 2020 indicated that police actions during the curfew enforcement resulted in 15 deaths and 31 serious injuries. Also, there were 87 reported complaints against police since the end of March. Some of the deaths attributed to police actions included that of a 13-years old who was shot by police while on their house balcony after the curfew began and a homeless man from the Mathare slums alleged to have violated the curfew hours. The killings in Mathare led to public demonstration. The demonstrators argued that police brutality had led to more deaths than the COVID-19 itself.



Figure 2: Police actions during the enforcement of dusk to dawn curfew

E. Mental Health Problems and Trauma

Loss of livelihoods and confinement that resulted from the imposed containment measures for COVID-19 yielded cases of trauma and mental health problems. The cessation of movement in and out of specific counties, quarantine and the dusk to dawn curfew resulted in isolation, containment and loss of livelihoods which in turn caused loneliness, fear, anger and stress from lack of basic needs, particularly among the low-income citizens. According to Infotrack surveys, Covid-19 had caused worry and anxiety to about 75% of Kenyans.

Regular media interviews with health experts revealed the emergence of suicides and mental health problems associated with COVID-19 impacts. The stigma around the disease posed psychological distress not only to those who had recovered from COVID-19 and their families but also to some healthcare and

frontline workers. As a result of family-related frustrations, a young woman killed her four children while a man killed his wife and son in June 2020. A policewoman shot and injured her husband on the allegation of him giving their house help US\$ 0.5 without her knowledge.

F. Teenage pregnancy

The COVID-19 containment measures that led to the closing of schools, "stay home" directive and restricting movement exposed girl to sexual violence. For instance, the restricted movement somehow hindered accessing sexual and reproductive health and rights (SRHR) information and services. In some hospitals, most of the health workers were reassigned to the COVID-19 crisis. The survey established that most people refrained from going to the hospital in fear of contracting COVID-19 and also increased transport costs to health facilities. The "stay home" directive, which caused the loss of livelihoods particularly in low-income households, forced some children to engage in income-generating activities to support their families. Where schools provided meals and sanitary towels, their closure brought to an end the provisions. These factors singularly or combined increased the vulnerability of young girls to transactional sex to meet their essential needs and also support their families. Although the available March to May data from a government health information system shows no increase in teenage pregnancy compared to the same period in 2019, numerous several cases of teenage pregnancies emanating from defilement by close family members and friends have been reported. During the pandemic period (March to May), about 200 girls aged 14 years and below sought for prenatal services in Machakos County.

IV. THE FLIPSIDE OF COVID-19

Globally, the COVID-19 pandemic has led to miseries. Whereas this is true, it has opened up opportunities in Kenya that could have otherwise not be exploited. This section highlights the opportunities created by COVID-19.

A. Innovations

The COVID-19 crisis presented opportunities for young people to develop new technologies in response to the pandemic. Following a series of innovations ranging from the simple hand washing machine to ventilators by Kenya citizens, the government of Kenya through Konza Technopolis Development Authority (KoTDA) alongside other partners launched the Great Covid-19 Innovation challenge. The goal of the challenge was to harness the collective capability of the technology and innovation sector. In addition, the COVID-19 ICT Advisory Committee invited local ICT innovations in food, transport, livelihoods, health, security and economy sectors. Some of the major innovations that emerged to counter the effects of COVID-19 are:

i. Ventilators

A ventilator is an appliance for artificial respiration. Thus, it helps a patient breathe. In severe cases of COVID-19, patients require the use of ventilators, which unfortunately are only a handful in

Kenya. Teams of students from Jomo Kenyatta University of Agriculture and Technology (JKUAT) and Kenyatta University developed ventilators (Figure 3). The ventilators largely used locally available materials and would run continuously on a 12-voltage battery, electricity or solar. Kenyatta university had a capacity of producing 50 ventilators a week at a cost of KSh 500,000 (US\$ 5000) each.



Figure 3: A team of students from Kenyatta University with their locally made ventilator dubbed as Tiba Vent.

ii. COVID-19 Testing kits

The Kenya Medical Research Institute (KEMRI) developed automated modern testing kits that can test up to 35000 samples in 24 hours. The testing kits have been in use in government testing centres, including KEMRI centres in Busia, Kisumu and Kilifi. Also, KEMRI developed the Point of Contact Rapid Test (PoCT).

iii. Contact Tracing Apps and Web-Based Digital Platform for COVID-19

People in close contact with someone infected with COVID -19 are not only at higher risk of getting infected but also have the potential for infecting others. Through contact tracing, persons in close contact with those infected are identified, assessed and managed to prevent onward transmission. The Kenya government embraced this strategy of combating the spread of COVID-19 sparking innovation of Apps. A team of three students from JKUAT developed Contact Tracing and Case Management App. The App helps in identifying who, where, and when a person gets

into contact with a Covid-19 positive person. Besides, the App includes triaging and case management functions hence reducing cumbersome manual records.

The need to establish the infection trend led to the development of a web-based digital platform that predicts COVID-19 infection trends in Kenya. The platform provides important and diverse data that is crucial in predicting COVID-19 infection trends in Kenya.

iv. Hand Washing Machines

The call for handwashing as the cheapest and safest way of sanitizing saw an emergence of manual and automated handwashing machines (Figure 4). Innovators used wood, scrap metals and plastic containers. A team of students from Pan African University invented an Automatic Solar Powered Hand Washing Machine that is equipped with a sensor that detects every step when one wants to wash his hands. The machine senses movement of hands closer to the two fitted taps and within a second dispenses soap. For 15 seconds a person will be allowed to scrub his hands and within the next 15 seconds, water flows for rinsing of hands after which it would automatically switch off.

v. Personal Protective Equipment (PPE)

The rise in PPEs demand and its short supply from the exporters, several companies started making them not only for local consumption but also for export. The Democratic Republic of Congo (DRC) benefited from the PPEs produced in Kenya. Similarly, the demand for face masks led to its production by the Kitui County Textile Centre (KICOTEC) and Eldoret-based Rivatex started producing face masks. KICOTEC produced up to 30,000 pieces of masks day. Hand wash and alcohol-based sanitizers were also produced locally by Jomo Kenyatta University of Agricultural Technology (JKUAT) and other private companies and individuals.



Figure 4: A manual hand washing machine invention by a schoolboy

B. Improved Hospital Facilities

Although the inpatient bed density remains low at 14 beds per 10,000 people in Kenya against the average of 27, the measure taken to curb the spread of COVID-19 enhanced health infrastructure. The unpredictability of the health impacts COVID-

19 pushed the national government to fund county governments to improve health facilities in the respective counties. In response to COVID-19, the county governments were allocated US\$ 500 million as conditional grants to improve their health infrastructures. Also, the national government had allocated US\$ 10 million for recruiting additional 6,000 health workers. Each county was required to have a minimum of 300 beds each to COVID-19 isolation facilities. By implementing this directive, the bed capacities in health facilities will improve substantially. With enhanced bed capacity, the pressure on bed space for the patients with non-communicable diseases like diabetes, hypertension and cancer will be eased. Besides, the improved infrastructure will support core universal health interventions and combating malaria, TB and HIV/AIDS. A statement by the chairperson of Council of Governors (COG) indicated that by end of June 2020, 36 counties had a total of 343 beds (Figure 5) while 28 counties had acquired a total of 337 ventilators.



Figure 5: (a) An Improved Msambweni hospital in Kwale County and (b) the newly installed 35 ICU bed in Murang'a

C. Diversification of Livelihoods

The "stay home" directive disrupted the economy of the country with the majority of the employees in private enterprises either losing their jobs or having pay cuts. The government ordered people to work from home except for essential services. Thus, the majority of people were required to stay at home. Further disruptions were occasioned by the cessation of movement in and out of Nairobi Metropolitan area which hosts the capital city, Mombasa and Mandera counties. The majority of the people who lost their jobs and those who were still in employment but staying at home sought alternative sources of livelihoods. As a consequence, the car boot vegetable business boomed soon after

the country partial lockdown (Figure 6). Majority of the people who engaged in car boot business were initially the taxi operators and those who lost their jobs or whose line of trade was affected by measures put in place to contain the disease. As an alternative source of livelihood, the survey revealed that some of the people intend to continue with the vegetable business even after the pandemic. However, some entrepreneurs started businesses such as making hand sanitizers and face masks after identifying a gap and chose to cash in. Although the quality of the hand sanitizers and face masks was not guaranteed, many Kenyans used them because of their accessibility and affordability.



Figure 6: Car boot vegetable business along the roads in residential areas

The long boring days occasioned by the "stay home" government orders for people who were still in employment provoked business thoughts. Key among the ideas actualized were the establishment of general merchant shops and agribusinesses. Mr Chore, a lecturer at Garissa University had this to say.

"Staying at home is very boring especially when you have nothing to do. I am just in the house without any work. What could happen if the university decides not to pay us? My God, I would be a beggar. This COVID-19 has taught me a big lesson. I need to diversify my livelihood source. I have started poultry and dairy farming. I have over 300 birds and 40 calves on my farm."

Prof. Huho who is an Associate Professor of Geography at Garissa University started greenhouse farming after a month of staying at home (Figure 7).



Figure 7: Prof Huho tending his tomatoes in a newly established greenhouse during the COVID-19 "stay home" break

D. Improved Hygiene

The call for handwashing and sanitizing was largely embraced. Washing points were located in strategic locations in public places (Figure 8). Regular handwashing has become the norm. Whereas the culture of shaking hands for greetings may not disappear completely, a shift from the practice is expected henceforth. A quick telephone survey for this study revealed that 52% of the respondents were against the usual way of handshaking after COVID-19. They argued, where shaking hands is inevitable, that they will prefer to use a fist bump or high five. However, the other 54% stated that handshaking is African and they will continue after containment of COVID-19. Studies indicate avoidance of handshaking greatly reduce the spread of bacteria between people. The probability of transferring bacterial through normal handshake reduces by half compared to a high five and even lower when fist bump is used.



Figure 8: Hand washing points in public places in Kenya

E. Adoption of ICT

With all educational institutions closed down in mid-March 2020, institutions at all levels were required to looking for alternative ways and means of ensuring that learning continues remotely. The ministry of education partnered with other stakeholders to ensure learning was going on. This was through TV and radio. In universities and high-cost private institutions (primary and secondary), online learning pedagogy was adopted. The online teaching has opened up opportunities not only for content developers but also for the establishment of institutions in remote areas where learners can be taught online. Meetings were held

remotely cutting the cost of travel and other logistics associated with meetings. Again, enhanced use of ICT has also been witnessed in the marketing sector than it has ever been in Kenya. In mid-March 2020, a digital directory for locally manufactured goods was launched by the Kenya Association of Manufacturers to help customers shop online via cashless platforms.

F. Tight Family Ties

Whereas the "stay home" directive by the government has seen the upsurge in domestic violence, on one hand, it has also led to even stronger bonds between families. The survey established that the 7 pm to 5 am curfew imposed in Kenya forced all family members to be in the house by early. Although men somehow felt oppressed by the curfew hours majority of the married women indicated that they were happy to have their husbands get home early. Some of the parents turned the "stay home" directive into opportunity by sparing time to and developing a more intimate relationship with their families. It was evident that the Covid-19 pandemic had reshaped relationships among spouses and children. Most families had become even closer than they were before with stronger bonds since parents and kids had more time together. Mr Mwangi, a residence in Machakos County, states the following.

"This COVID-19 has made me realize that I had unknowingly neglected my family. I never had quality time my children since most of the times I will get home not earlier than 8 pm. Soon after they will go to sleep. Besides, I never had time to look at their school homework or what they are taught at school which am currently doing. I am also assisting my wife with some duties at home. My family is now united than before"

G. Financial Relief

COVID-19 presented two sides of the financial wellbeing of the citizens. Whereas some people faced financial hardships as discussed earlier, some enjoyed full or partial tax relief from the government for three months. The part of the salary that could have otherwise consumed by the tax was spared and used for other purposes. Other financial relief included the suspension of bank loans, suspension of blacklisting in Credit Reference Bureau (CRB blacklists loan defaulters) and some tenants had their house rent waived or reduced. The *boda boda* riders (motorcycle taxis), particularly those who sneaked people past the erected road barriers that prevented movement in and out of the counties of Nairobi, Mombasa and Mandera, indicated that the business was rewarding. They made up to US\$ 30 per day against the usual US\$ 10 -15 without the barriers.

V. LESSONS LEARNT

COVID-19 has undoubtedly taught people several lessons. Among the major lessons learnt were:

- Never rely on a single source of income. After the job losses, people with one source of income were the most affected since they had nothing to cushion themselves against.
- Family comes first. Under the guise of working, some parents had absconded their families. where jobs were lost, the truant parents went back to their families for material and emotional support.
- The important role of teachers in society. The closure of schools has since forced parents to stay with their children at

home. This study established that most parents preferred when their children were in schools where teachers guide them on academic work and discipline. Some respondents argued that teachers, particularly at elementary levels, ought to be the highest-paid civil servants in Kenya.

- d) Potential adoption of flexible working conditions. The "work from home" directive by the government has seen enhance the use of technology to achieve while at home what could have otherwise been in the office. Working from home has not only minimized transport costs incurred by employees but has also saved on office overhead expenses and also office spaces.
- e) Potential adoption of online learning. Although online learning is not a new phenomenon in Kenya, its uptake by many learning institutions (basic education to tertiary education levels) during the COVID-19 crisis was an indicator that of the possible increase of online learning centres.
- f) With good political will, Kenya can industrialize earlier than anticipated. The innovation such as the development of ventilators and test kits by university students and other people was an indicator on the level of technological development capacity available in Kenya. It only requires adequate financing and establishment of innovation hubs.

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A Situational Analysis of Mt. Kenya Conservation Area Using GIS and Remote Sensing: Ecosystem Benefits to Communities.

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Abstract- For quite some years, communities living in the Mt. Kenya conservation area have benefited from the several ecosystem services found within it such as; food, water, biodiversity, tourism and recreation, fuel and energy, timber and housing materials just to mention a few of them. This study analyzed the socio-economic benefits that resulted from sustainable management of these resources and also assessed the state of the environment for the past twenty years.

Both the Geographical Information Systems (GIS) and Remote Sensing (RS) tools were utilized to assess the state of the environment. Mt. Kenya National Park, owned by the government and Il Ngwesi Community Conservancy were used as sample study sites for the eco-region. Satellite Images used in the study, were from the years 1990 to 2010.

Landsat images were used to assess land use and land cover changes for the past twenty years (1988 to 2010) for a 5 Km buffer zone using ArcGIS, Idrisi and Erdas Imagine software. Thus, the analysis gave an insight into the state of the natural resources and the sustainability of the diminishing resources. GIS and satellite images indicated land cover reduction of the feature classes such as forests, grasslands, and scrubland and shrub land. The glaciers on Mt. Kenya have reduced and this has affected the river regimes in the catchment area. This has led to an increased demand for the scarce resources leading to overexploitation and

to human-human and human-wildlife conflicts over water, grass and other resources.

Key Words: Communities, Conservancy, Conservation, Ecosystem Services, GIS.

I. INTRODUCTION

Ecosystem Services are the processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants. Whether we find ourselves in the city or a rural area, the ecosystems in which humans live provide goods and services that are very familiar to us [Ecological Society of America, 1997].

This study focused on National Park, IL Ngwesi community conservancy and communities living in the vicinity of these conservation areas. Mt. Kenya is located on the equator 180 Km North of Nairobi. It is a solitary mountain of volcanic origin with a base diameter of about 120 Km and at an altitude of 5199 m above sea level with deeply incised u-shaped valleys in the upper parts. Mt. Kenya is a World Heritage site, [Gathaara, 1999]. There are twelve small glaciers remaining from the earlier glacial periods, and which are receding rapidly and may disappear during the next century [KWS, 1992].

The mountain is a water catchment area with several rivers flowing in different directions. Some of the rivers have curved deep valleys with steep gorges such as the Sirimon gorge. The Northern part of the mountain is exceptional to this general description. The ground is more gently undulating with fewer streams. There are a number of volcanic cones and craters such as **the** Ithanguni and **the** Rutundu cones.

The altitude variation on Mt. Kenya gives rise to a wide variety of **climatic zones**. The wettest part of the mountain is to the South - East which receives up to 2,500 mm **of rain** per year. The mountain is driest to the North which receives less than 1000 mm **of rain per year**. The altitudes with the highest rainfall are between 2,700 m and 3,100 m **above sea level**. Rainfall decreases with altitude and above 4,500 m, most precipitation falls as snow or hail. Temperature also varies considerably with altitude but the average temperature at 4,750 m is **x °C**.

Mt. Kenya National Park has **x** vegetational zones [KWS, 1992], the Nival Zone lies above 4,500 m **above sea level** and the vegetation is characterized by mostly mosses and lichens. The Afro-alpine Zone lies above 3,500 m **above sea level** whereas the Moorland is characterized by tussock grasses. The most notable adaptations are **the** Giant groundsels, Cabbage groundsels, and Giant lobelia. High altitude Heath lies between 3,000 m and 3,500 m **above sea level**. The habitat is characterized by shrubs with small leaves. These include Heathers (*Calluna vulgaris*), African Sage (*Salvia aethiopsis*), Protea (*Protea cynaroides*), and Herichrysum (*Helichrysum petiolare*). The Upper forest zone lies above the Bamboo zone and is characterized by smaller trees scattered in glades. The dominant species are East African Rosewood (*Dalbergia melanoxylon*) and St. John's wort (*Hypericum perforatum*). Many of the trees are festooned with mosses and old man's beard trees [KWS, 1992].

The Bamboo zone forms a dense belt between 2,500 m and 3,200 m **above sea level**. The belt is thickest where it is moistest on the South - Eastern side of the mountain. It is absent entirely on the Northern side. The Montane forest descends as low as 2,000 m and the characteristic species are pencil Cedar and Podo. The threats and damages to Mt. Kenya forest were recorded as charcoal production, cultivation of marijuana (*Canabis sativa*), fire occurrences, Shamba (mixed farming) system practices in the forests, grazing of livestock and logging of Camphor, Wild Olive and East African Rosewood [KWS, 1992]. Mt. Kenya has a wide variety of wildlife and six species of large mammal of international conservation interest occur within the forests such as elephant, black rhino, leopard, giant forest hog, bongo and black-fronted duiker.

Il Ngwesi II Group Ranch (GR) which is also known as (Il Ngwesi community conservancy), lies between 0° 16' to 0° 25' North and 37° 17' to 37° 26' East [Harrison, 2001]. This group ranch consists of 8,645 ha of community managed land located in Mukogondo Division, Laikipia District, North of Mount Kenya, [Ojwang *et al.*, 2010] or (Plate 3.21). Il Ngwesi meaning "People of Wildlife" was among the first community-led conservation initiatives established in Northern Kenya. The ranch was established in 1995 with the aim of producing extra income from tourism and regenerating wildlife populations with the assistance of Lewa Conservancy. The Group Ranch is split up

into a settlement area and a conservation area. The core area has a radius of 5 Km² while the buffer area totals 6,000 Ha. Grazing in the buffer area is regulated and is not permitted after the rains to allow good grass growth. The highlands to the West are largely occupied by the upland-dry forests of the Mukogondo Forest Reserve and the grassland plains of Anadanguru. The medium altitudes of the plains are characterized by wooded grassland savanna, a mixture of grasses, dense thorn-shrub thickets [Harrison, 2001].

The Geographical Information Systems (GIS) constitute a considerable expansion of the capacity of humans and organizations to manage and make use of such information. [Ojwang *et al.*, 2010] states that, sub-division of some formerly large ranches and communal lands have resulted into habitat fragmentation and threat to the bio-diversity existing outside the protected areas. Increasing intensive crop cultivation and loss of vegetation cover in areas adjacent to the protected areas resulted in unchecked land use conflicts. The complexity of the biological, ecological, and physical processes, which comprise natural systems, makes modeling a potentially valuable tool for anticipating responses to management options [Toxopeus, 1996] or [6]. The traditional method of representing the geographic space occupied by spatial data is as a series of thematic layers [Heywood *et al.*, 1998]. [Spencer, 2003] indicated that, GPS for ground truthing is used to create, correct, interpret, assess accuracy or somehow modify existing geospatial data. Two common uses for geo-referencing aerial or satellite images and classifying satellite images is by deriving land use and land cover (Leica Systems, (2006).

According to [Spencer, 2003], GPS data when put into a GIS, gives the researcher the ability to link a spatial data to real World coordinates. [Wadsworth and Treweek, 1999], stated that most ecological data are collected using some form of ground survey. [Jensen, 2000], observed that remote sensing has the capability to provide synoptic views over very large areas very quickly. Most ecological studies make use of data collected by sensors working in the visible and near-infrared parts of the spectrum.

According to [Johnson, 1998], image analysis can provide quantitative information about ecological properties, which cannot be easily derived from aerial photography or field studies. [UNEP, 2009], states gaps in vegetation cover caused by fragmentation can isolate populations of certain species and lead to their demise while land and water degradation render habitats unhealthy thus threatening species survival.

Deus and Gloaguen [2011] in their study on Tarangire National Park (TNP), stated that, the three main land-cover categories namely barren, woodland and grassland have been identified and mapped successfully using four sets of landsat images; MSS 1979, MSS 1988, ETM+ 1999 and TM 2009. The land covers were estimated to occupy; woodland 52.82% (1515 Km²), grassland 40.24% (1154 Km²), and barren 6.94% (199 Km²) of the total national park area in 1979.

Bertwistle [2001] reported having evaluated land cover data for the Albemarle-Pamlico peninsula to delineate landscape characteristics preferred by black bears and white-tailed deer. Data from surveys, monitors, and modeling were analyzed separately and results were spatially combined.

Clark *et al.*, [2008] stated that, the creation of the habitat map consisted of the following two steps: defining a set of land cover

classes (hereafter termed ‘habitat classes’) known to exist in the study area, and then using a remote sensing technique to classify the ortho-rectified imagery based on the pre-defined set of classes. A GIS could also be useful for yellow-eyed penguin habitat restoration and tourism management, Clark *et al.*, [2008]. This report described how the preferred vegetation cover for nest sites can be easily determined with a GIS. This information could be valuable for determining the type, amount and spatial layout (such as distribution and density) of vegetation that should be used in habitat restoration programs.

3. RESEARCH ELABORATIONS

The landsat images sourced from the Regional Centre for Mapping of Resources and Development, Kenya were used to assess the land cover and land use changes for a twenty-year’s period, between 1988 and 2010. The remote sensing images used were in TIFF formats which were imported to Erdas Imagine platform. The supervised classification analysis identified the following feature classes; Agriculture, settlements, grasslands, bare ground, thickets, shrubs, Forests, mixed forests, swamps, riverine vegetation, water and snow. All classes were assigned unique symbols for easier identification.

1. RESULTS AND FINDINGS

Two landsat images of 1988 and 2000 images of a ten year period were used to analyse the land use and land cover of Mt. Kenya National Park, (Fig. 1 and Fig. 2). However, there was a problem of cloud cover and stripping in most satellite images between 2001 and 2010.

The landsat image of the years 1988 and 2000, indicated the following; a decrease in water bodies by 152.91 ha, area covered by snow decreased by 1,494.45 ha, Moorland increased by 20,599.3 ha, Montane or upper forests decreased by 1,704.6 ha, area covered by bamboo decreased by 9,718.65 ha, heath or high altitude forests covered area decreased by 15,744.51 ha, and land on agricultural activities increased by 3,867.4 ha. The big increase in agricultural activities in the buffer zone was due to illegal logging in the forests, forest fires and impact of climate change on the mountain vegetation (Fig. 3).

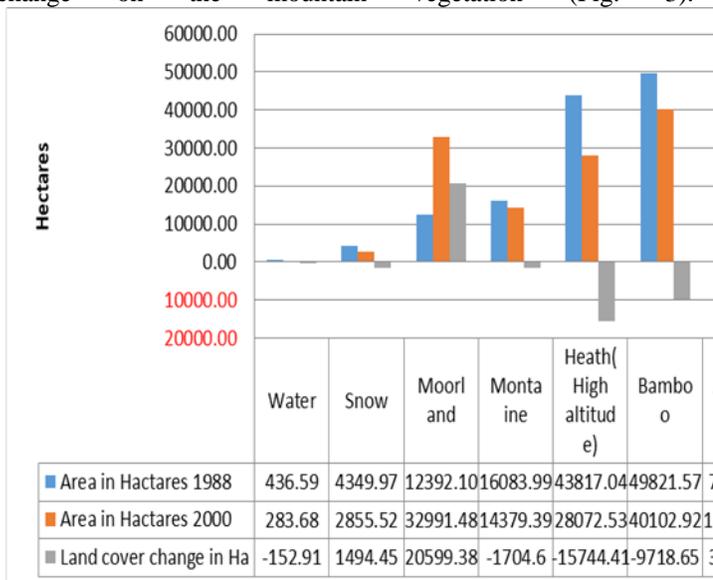


Figure 3. Land use / land cover chart for 1988 and 2000 images within Mt. Kenya National Park and its environs.

The land cover changes indicated an increase in agricultural activities of 3,867.4 ha. The diminishing resources could be linked to a decrease in; water of 152.9 ha, montane 1704.6 ha, bamboo 9718 ha and heath 15,744 ha.

The Landsat images of 1988, 2000 and 2008 were used for land use and land cover analysis for Il Ngwesi Conservancy (Fig. 4, 5, 6 and 7).

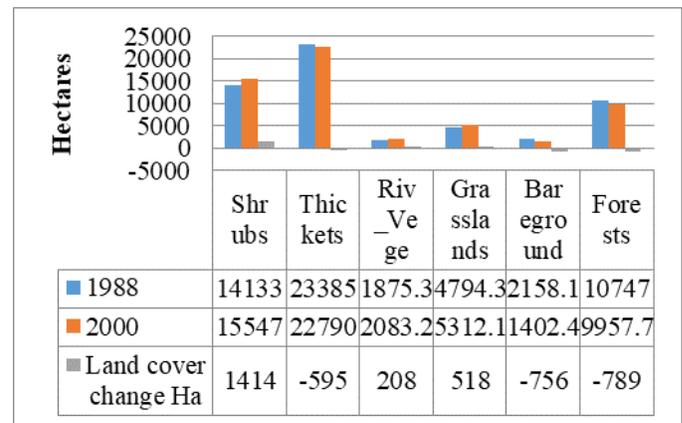


Figure.7. Land use / land cover chart of 1988 and 2000 images within Il Ngwesi conservancy and its environs.

Il Ngwesi Conservancy land cover and land use analysis (Fig.7), indicated a decrease in forest cover between 1989 and 2000 by 789 ha which continued to decrease by 931 ha between 2000 and 2008 within the park. Thickets decreased by 595 ha between 1989 and 2000 and continued to decrease to 1,073 ha between 2000 and 2008. Grasslands increased in area by 518 ha between 1989 and 2000 and continued to increase between 2000 and 2008 to 117 ha. Bareground area decreased by 756 ha between the years 1989 and 2000 but increased to 672 ha between the years 2000 and 2008. Thicket-covered area decreased to 595 ha and continued to decrease to 1,073 ha between the years 2000 and 2008. Forest cover decreased by 789 ha in the years 1989 and 2000 and by 931 ha between the years 2000 and 2008. Area covered by shrubs also increased by 1,414 ha between the years 1989 and 2000 and by 1,407 ha between the years 2000 and 2008. Area under Riverine vegetation increased by 208 ha between the years 1989 and 2000 but decreased by 228 ha between the years 2000 and 2008 (Fig. 8). It was noted that the land cover changes indicated a decrease in; forest cover by 931 ha, thickets area by 1073 ha and riverine vegetation by 228 ha.

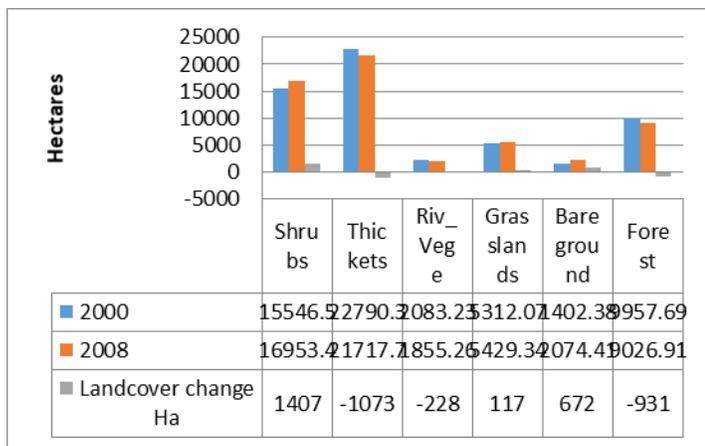


Figure.8. Land use / land cover chart for 2000 and 2008 images within Il Ngwesi conservancy and its environs.

2. CONCLUSIONS

The GIS analysis indicated that there was a general decrease of land cover and land use in hectares. There was a general decrease in areas under; forests, shrubs and bare land due to illegal logging in the forests, forest fires and impact of climate change on the mountain vegetation. The Landsat image of the years, 1988 and 2000 in Mt. Kenya indicated a decrease in the water bodies by 152.91 ha, area under snow increased by 2,855.5 ha, Moorland area increased by 20,599.3 ha, Montane or upper forests area decreased by 1,704.6 ha, area under bamboo decreased by 9,718.65 ha, heath or high altitude forests area decreased by 15,744.51 ha, and the land under agricultural activities increased by 3,867.4 ha. At Il Ngwesi, grassland area increased by 635 ha, bareground decreased by 84 ha, thicket area decreased by 1,073 ha, forests cover decreased by 931 ha and riverine area decreased by 228 ha between the years 1988 and 2000.

It is imperative to note that, communities living in the mountain conservation area benefited heavily from rivers waters, heavy rainfall as indicated by the types of crops grown in the high altitude areas, keeping of livestock, timber, firewood and eco-tourism. This is an indicator of the benefits of ecosystem services to the communities living in the conservation area. However, the study noted diminishing resources such as; forest cover, rangeland and heavy river water flow as indicated by the GIS analysis. This could be due to increased droughts and compounded by the impacts of climate change.

3. APPENDICES

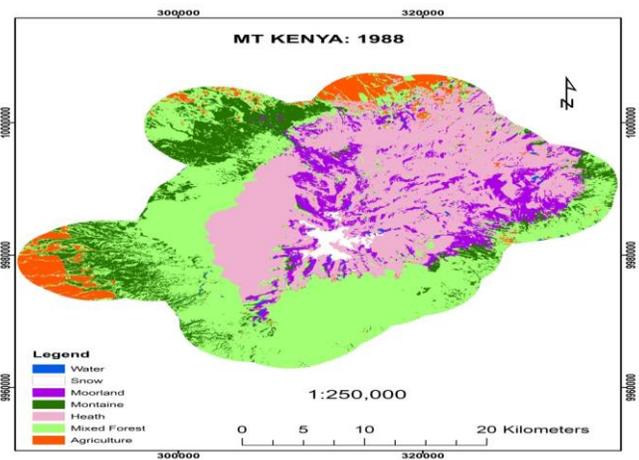


Figure 1. Classified image of land use / land cover types for the year 1988 within Mt. Kenya National Park and its environs.

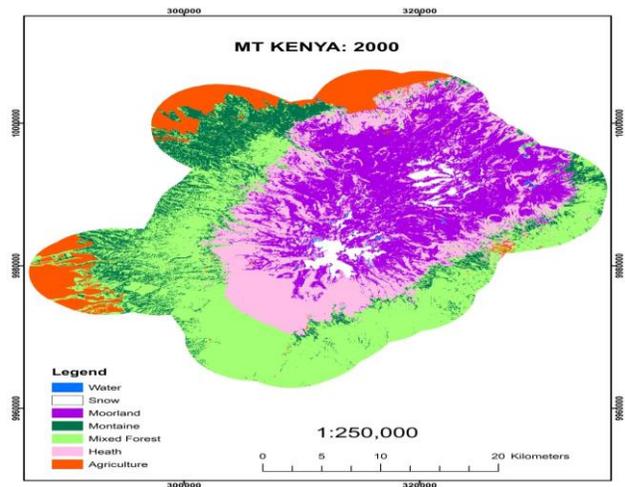


Figure 2. Classified image of land use / land cover types for the year 2000 within Mt. Kenya National Park and its environs.

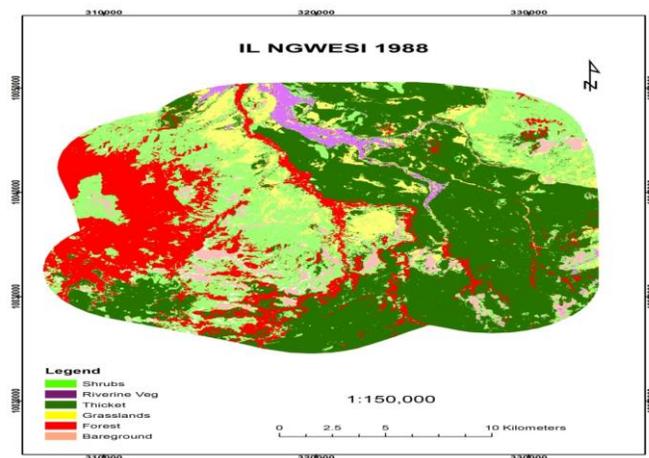


Figure.4. Classified image of land use / land cover types for the year 1988 within Il Ngwesi conservancy and its environs

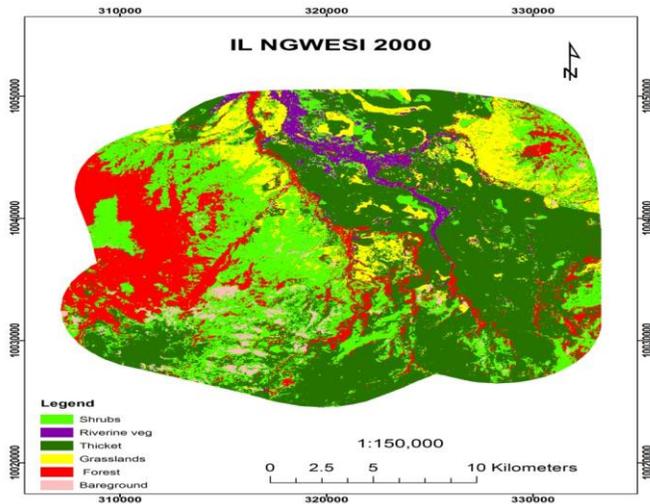


Figure 5. Classified image of land use / land cover types for the year 2000 within II Ngwesi conservancy and its environs

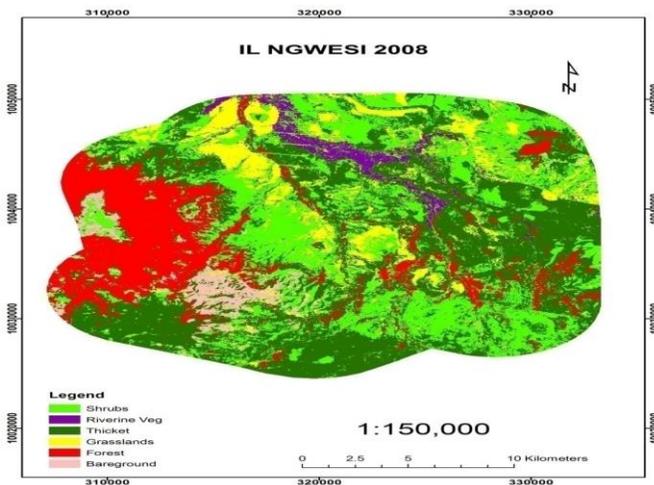


Figure 6. Classified image of land use / land cover types for the year 2008 within II Ngwesi conservancy and its environs

4. ACKNOWLEDGEMENT

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Governance Structures and Bank Performance: An Empirical Study of Commercial Banks In Uganda

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Abstract: This quantitative correlational study is devoted to three internal governance structures and one external governance structure that influence commercial banks' performance. The paper focuses on the relationship between board composition, board size, audit committee independence, and capital adequacy ratio and commercial banks' performance in Uganda. The data was analyzed using partial correlation analysis statistical technique after controlling for bank size and leverage. Based on survey data collected from the commercial banks in Uganda, the study results revealed that board composition, board size, and capital adequacy ratio are positively associated with bank performance in Uganda. In contrast, audit committee independence is negatively associated with commercial banks' performance in Uganda. However, the study yielded only two bank governance structures that have a statistically significant positive relationship with commercial banks' performance in Uganda. These governance structures are the internal governance structures of board composition and board size. The author recommends that the Bank of Uganda as the regulator and supervisor of banks and financial institutions in Uganda, should ensure that the governance structures discussed in this paper are strictly adhered to. This arrangement will ensure more effective internal and external governance structures, thereby enhancing bank performance in Uganda.

Key words: board composition, board size, audit committee independence, capital adequacy ratio, commercial banks, Uganda.

INTRODUCTION.

The purpose of the internal governance mechanisms is to establish internal governance structures such as board composition, board size, audit committee independence, etc. that guide and monitor firms' activities. These mechanisms comprise internal control monitoring and disclosure/transparency monitoring (Fanta et al., 2013; Kamau et al., 2018). Board composition refers to the proportion of outside directors to the inside directors, and the resulting structure of the board comprises of inside and outside directors (Cadbury Report, 1992; James & Joseph, 2015; Liang et al., 2013; Mehrotra, 2016; Praptiningsih, 2009). The Cadbury Report (1992) emphasizes that at least three non-executive directors should be on a board of directors. Appointing more outside board members to the board increases board independence, which helps to mitigate managerial opportunism arising from agency problems (Baktas & Kaymak, 2009; Fama & Jansen, 1983). The main advantages of board independence are that it allows the board to exercise greater autonomy when making decisions, scrutinizing management actions, and enables the separation of management and control functions (James & Joseph, 2015; Lim et al., 2007; Pandya, 2011).

Board size refers to the total number of directors on the board of directors of a firm (Hasan & Xie, 2013; Mehrotra, 2016; Praptiningsih, 2009). In practice, a large board would ensure better performance in terms of adequate advice on management decisions, reduction in managers' discretionary powers, and easy detection of the managers' opportunistic behavior (Andre & Vallelado, 2008). The audit committee independence as an internal governance structure of a board plays a vital role in ensuring sound financial reporting and fraud detection (Cohen et al., 2002).

The external governance mechanisms originate from outside firms, and their aim is to protect the interests of the stakeholders plus enhancement of firm performance. For banks, these mechanisms are imposed by statutory regulators such as central banks and international regulatory protocols such as the Basel III Accord (Basel Committee on Banking Supervision, 2011,2015). The most critical attribute for the regulatory monitoring mechanism in banking is the capital adequacy ratio. It is a measure of the amount of a bank's capital expressed as a percentage of its risk-weighted credit exposure (James & Joseph, 2015). The capital adequacy ratio is used to ensure that banks absorb reasonable levels of losses before insolvency sets in (Al-Tamimi & Obeidat, 2013; James & Joseph, 2015).

This study investigates the influence of the internal and external governance structures on commercial banks' performance in Uganda. As submitted by Beltratti and Stulz (2010), effective governance structures curb bank risks and enhance their performance. Furthermore, effective bank performance creates economic stability, healthy financial markets, which drive investments and bolster confidence among depositors and investors (Cohen et al., 2002; Maher & Andersson, 2000). The internal and external governance structures considered in this study are board composition, board size, independent audit committee, and capital adequacy ratio. The dependent variable for the study is bank performance measured as return on assets (Shoeyb et al., 2016). The banking sector has experienced a dynamic and turbulent environment in Uganda during the last two and a half decades

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due to inadequate governance structures (Oloo, 2011; Tumusiime-Mutebile, 2012). The banks which collapsed inflicted emotional torture among the stakeholders comprising of customers, employees, the general public, shareholders, regulators, and the banking sector as a whole (Adnan et al., 2015; Hull, 2010, Isaac & Nkemdilim, 2016). This study is an attempt to investigate the relationship between internal and external governance structures and commercial banks' performance in Uganda.

Objective of the Study.

The objective of the study is to investigate if there are statistically significant relationships between board composition, board size, audit committee independence, capital adequacy ratio and commercial banks' performance in Uganda after controlling for bank size and leverage.

Research Hypotheses.

The null hypotheses for the study are:

Ha₀: There is no statistically significant positive relationship between board composition and commercial banks' performance in Uganda.

Hb₀: There is no statistically significant positive relationship between board size and commercial banks' performance in Uganda.

Hc₀: There is no statistically significant positive relationship between audit committee independence and commercial banks' performance in Uganda.

Hd₀: There is no statistically significant positive relationship between capital adequacy ratio and commercial banks' performance in Uganda.

LITERATURE REVIEW.

This section reviews literature about the internal and external characteristics of board composition, board size, capital adequacy ratio and audit committee independence. It also reviews literature on the control variables of bank size and leverage and commercial banks' performance in Uganda.

Board composition. Board composition is one of the critical elements of the board structure for the internal control monitoring mechanism of corporate governance. For a long time, the board structure for banks concerning composition and size has been on top of the agenda for international bodies such as the European Union and the Basel Committee on Banking Supervision (Steponova & Ivantsova, 2012). This is because board composition is viewed in many governance studies as a tool that can influence top management decisions in a firm. The above argument is in line with the corporate governance philosophy that an active board should be capable of enhancing organizational performance through effective monitoring and control of management to ensure that the corporate governance system within the organization does not breakdown (Adebayo et al., 2014; Mehrotra, 2016; Sunil & Santanu, 2012; Velnampy, 2013). A board of directors has the responsibility of ensuring that a firm has an effective internal control system that functions normally (Jansen, 1993). The other essential duties for a board of directors are resource dependency, monitoring, and controlling management performance (Abdullah, 2004; James & Joseph, 2015; Pandya, 2011). The above responsibilities assist the board in ensuring proper utilization of organizational resources and protection of the stakeholders' interests. It is, therefore, of essence that boards of directors should concentrate on service, control and strategic direction of the organizations they monitor.

Although many firms are managed by executive directors who possess specialized skills, expertise, knowledge and vast experience, resource dependency theory advocates that independent directors contribute new ideas, information, and expertise gained from other organizations to boards where they are executive directors (Andres & Vallelado, 2008; Htay et al., 2013; James & Joseph, 2015; Nyamongo & Temesgen, 2013). Furthermore, board independence enhances bank performance because the outside directors have to protect their reputation, and as such, they ensure that boards carry out effective monitoring of management (Steponova & Ivantsova, 2012). It is, therefore, evident that when boards dominated by independent directors to monitor firms, such boards enrich their strategies and positively influence their performance. Based on this evidence, Bank of Uganda (BOU or Central Bank) which is charged with the banking regulatory and supervisory functions in Uganda, ensures that board compositions for the commercial banks in Uganda comprise of both outside and inside directors (BOU Annual Supervision Report; 2014; Financial Institutions Corporate Governance Regulations, 2005).

Past studies have used quantitative approaches to establish the association between board composition and firm performance. For instance, Grove et al. (2009) adopted a quantitative approach in their study on US banks and found positive effects of outside directors on assets' returns. There are also studies on board composition and bank performance from emerging markets where correlational analysis has been used. For instance, the Bino and Tomar (2012) study on Jordanian banks yielded a positive relationship between board composition and bank performance. In practice, this is what should be expected because the presence of such directors on the board leads to improved supervision of management, reduced conflict of interest among stakeholders, and enhanced strategic decisions, all of which enhance the banks' performance (Joseph & James, 2015).

However, other researchers reported contradictory results regarding the relationship between board composition and firm performance. This category includes researchers from emerging markets such as Laing and Li (1999) from China; Kula and Tatoglu (2006) from Turkey, Kyereboah and Biekpe (2006) from Ghana. They all reported negative relationships between board composition and firm performance. At the same time, there are researchers such as Abdullah (2004); Daily and Dalton (1994); Hermalin and Weisbach (2003); Tian and Lau (2004); Aebi et al. (2012); James and Joseph (2015) who did not find any statistically significant relationship between board composition and firm performance.

Although the quantitative approaches are widely used to study the board composition internal governance structure, these quantitative approaches usually fail to assess the processes within boards. Fortunately, mixed methods approaches can be used to assess processes such as different verbal behaviors exhibited by board members in boards (Currall et al., 1999). This is because

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mixed methods approaches provide a complete understanding of research problems (Creswell, 2014).

The review of studies has revealed that research on the relationship between board composition and bank performance has not produced converging results and, therefore, the need for further exploration of this relationship.

Board size. Board size is the other internal governance structure covered in this study. A large board size is in line with the agency theory philosophy since such a board is more vigilant in monitoring and controlling a firm's top management. A large board has more human resources, experience, and a broad knowledge base (Andre & Vallelado, 2008; Mehrotra, 2016). Mehrotra (2016) submitted that board size is a significant determinant of effective board performance.

The optimal board size should be not less than eight directors but not more than 10 (Lipton & Lorsch, 1992; Cadbury Report, 1992). The optimal board size is based on the premise that large boards bog down the decision making process since it cannot expeditiously agree on decisions that are crucial to firm performance. In contrast, small boards reduce decision-making precision due to inadequate views and discussion (Mehrotra, 2016). It is also important to note that small boards have some advantages too. For instance, Yarmack (1996) posits that firms with small boards are highly valued in the capital markets. This position is supported by Bermig and Frick (2010), and they contend that smaller boards generate superior firm performance due to their effectiveness in monitoring top management at lower costs. Other researchers, such as Jensen (1993), Lipton and Lorsch (1992) advocate for small boards since corporate governance independent of other board attributes is affected by the board's size.

Methodological research on board size has mainly employed quantitative approaches in examining the relationship between board size and firm performance. Correlational analysis was used by Mehrotra (2016) while exploring the relationship between board size and firm performance of 100 US firms. The study revealed that firm performance was independent of board size. However, Staikouras et al. (2007) applied correlational analysis in a study of the operating performance of the banking industry of the South-Eastern European region. They found that board size had a statistically significant relationship with bank performance. The reviewed studies indicate that quantitative approaches have been employed to establish the nature of the relationship between board size and bank performance. Nevertheless, the results from these studies have been contradictory and inconclusive.

Audit Committee Independence. Audit committee independence ensures that independence in a firm's corporate governance is achieved (Cohen et al., 2002). Additionally, the credible assurance for a bank's activities are usually achieved through financial transparency (Zulkafli & Samad, 2007). According to Tumusiime-Mutebile (2012), independent internal and external auditors enhance banks' performance by ensuring that: i) A bank's financial statements are accurate ii) A bank's financial statements fairly reflect the correct financial position of the bank iii) Management's compliance with the policies and procedures of the bank are monitored. The same competencies are also emphasized by the Institute of Directors of Great Britain (2017). Within the bank, there must be an internal auditor who is independent of management reporting to the board's audit committee. This committee has the cardinal responsibility of protecting the shareholders' interests as far as financial oversight and control are concerned. Chou and Buchdadi (2017) asserted that the independent audit committee is viewed as a governance attribute that plays a critical role in the banking sector.

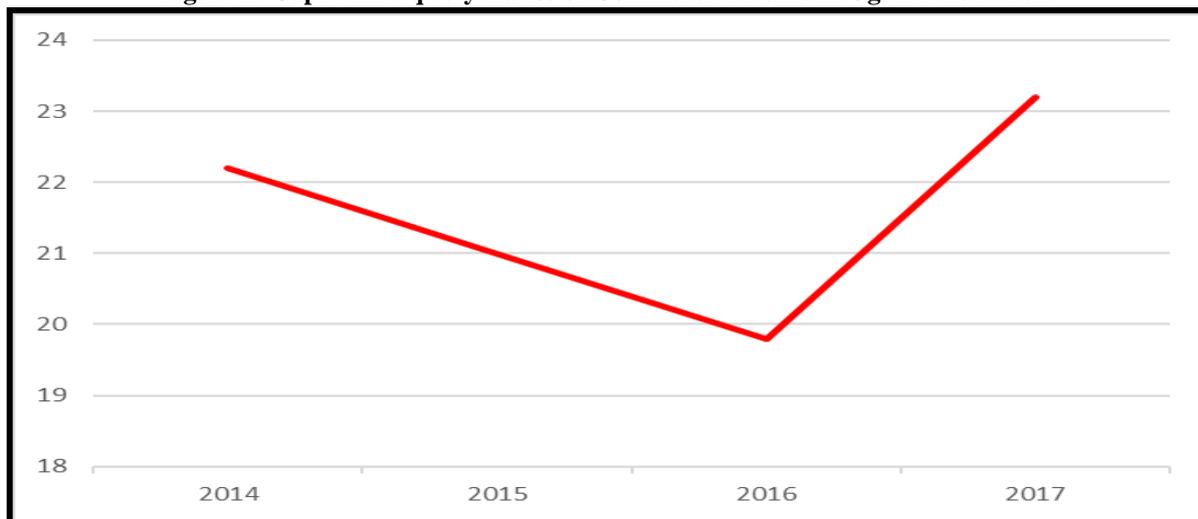
On the methodological research literature, Zábajňáková (2016) investigated the relationship between audit committee independence and performance of United Kingdom firms. She applied quantitative correlational analysis and deduced that the audit committee independence was negatively correlated with firm performance. Furthermore, Ahmed (2018) found that firm performance was positively correlated with audit committee independence while studying the characteristics of Jordanian firm performance. Given the outcomes of the past studies, it is evident that studies involving audit committee independence and firm performance have been carried out using quantitative methodology. However, the results have been inconclusive.

Capital Adequacy Ratio. This is a variable for the regulatory monitoring mechanism for banks. The Basel III Accord (2010) set the minimum capital ratio of at least 8% of the risk-weighted assets (Bank for International Settlement, 2011). Globally, financial regulation and supervision are necessary for guiding the operations of banks and other financial institutions. The capital adequacy ratio and the Basel III Accord (2010) are the essential regulatory tools in the banking sector. Without effective financial regulation and supervision of banks, the crises that have ran down banks and other financial institutions in the past cannot be avoided (Saunders & Cornett, 2009). As submitted by Williams and Nguyen (2005), capital regulation generates two advantages for the banking sector: 1) protection of consumers and depositors, 2) reduction of systemic risks. In the banking sector, there has been a massive increase in financial regulation and continuous supervision of banks in the post-global economic meltdown of 2007/2008 era as a result of poor corporate governance of banks and other financial institutions (Hwa-Jin, 2016). According to Andres and Vallelado (2008), Hwa-Jin (2016), Onakoya et al. (2012), and Tumusiime-Mutebile (2012), financial regulation and supervision by statutory bodies in various countries are additional mechanisms for governance of banks. In Uganda, several banks have collapsed in the past due to weak financial regulation and supervision (Tumusiime-Mutebile, 2012).

The Bank of Uganda is empowered to carry out the financial regulation and supervision functions of all banks and other financial institutions in Uganda. This arrangement is of great importance to the banking sector's stakeholders because the banking business involves a high level of information asymmetry, which diminishes the stakeholders' capacity to monitor management decisions (Andre & Vallelado, 2008). The regulator of banks uses on-site inspection to review the banks' financial state, evaluate the adequacy of their risk management systems, and assess the degree of compliance with the laws, regulations and prudential guidelines (BOU Annual Supervision Report, 2014). The regulator also uses off-site inspection on a continuous basis through the collection and analysis of financial information. The capital adequacy serves the purpose of ensuring that banks can absorb reasonable levels of losses before becoming insolvent to a level where the depositors' money is lost (Al-Tamimi & Obeidat, 2013; James & Joseph, 2015). In 2017, Bank of Uganda reported that the capital adequacy ratios for commercial banks in Uganda were

much higher than the recommended Basel III Accord (2010) rate of 8% (BOU Annual Report, 2017). For the period 2014-2017, the capital adequacy ratios for commercial banks in Uganda were more than double, as depicted in Figure 1.

Figure 1: Capital Adequacy Ratios of Commercial Banks in Uganda 2014-2017



The methodological literature shows that studies involving the capital adequacy ratio and bank performance have been mainly quantitative. For instance, Umoru and Osemwegie (2016) investigated the relationship between capital adequacy and banks' financial performance in Nigeria using quantitative techniques. Their study revealed an increase in banks' capital base leads to a significant increase in return on assets. Another study carried out by Praptiningsih (2009) used a quantitative methodology and found that a statistically significant positive relationship existed between the capital adequacy ratio and bank performance. The findings of Fanta et al. (2013), supported the above results where, capital adequacy ratio had statistically significant positive with bank performance in a study of Ethiopian commercial banks. However, James and Joseph (2015) found a significant negative relationship between capital adequacy ratio and bank performance in a study on the banking sector in Malaysia. Therefore, it is evident that past studies involving capital adequacy ratio and bank performance were carried out using quantitative approaches, although the study results have been contradictory and inconclusive.

Bank Size. The natural logarithm of total assets an organization has measures the bank size. In this study, it is one of the control variables related to firm-specific characteristics that influence bank performance (Adnan et al., 2015). Large banks are capable of attracting various resources such as the best human resources in the market, financing sources, large customer bases, and the ability to embrace the latest technological advances, all of which can enhance efficiency. Accordingly, all these resources are expected to have a positive influence on bank performance. Bank size is a significant determinant of the type and variety of the services and products a bank can extend to its customers. Large banks have the capacity to provide large sets of services and products to their customers, and its effect is increased earnings in terms of commissions, fees, and interest income. These advantages imply that banks with large asset bases are characterized by low costs and high returns on assets (Aladwan, 2015; Baktas & Kaymak, 2009).

Leverage. Leverage is measured by the proportion of debt to equity in the firm's capital structure, and it is a firm-specific characteristic that influences bank performance (Onuonga, 2014; Adnan et al., 2015). It is the second control variable for this study. The significance of leverage is to indicate how risky a firm is (Quadri et al., 2015). Furthermore, the trade-off between strengthening equity governance and maximization of enterprise value is a result of high leverage of banking institutions (John et al., 2016).

Bank Performance in Uganda. The primary goal of governance structures is to create a balance of power-sharing among shareholders, directors, and management to enhance shareholder value and protect the interests of all stakeholders (Andres & Vallelado, 2008; Olof et al., 2007). An effective governance system that improves the long term shareholder value and investor confidence should involve corporate accountability, economic performance, reliable and quality of public financial information, integrity, and efficiency of capital markets (Adebayo et al., 2014; Simon & Karr, 2001; Velnampy, 2013). The second purpose of an effective governance system is to ensure that structures, processes, and mechanisms are put in place to raise the ethical standards, ensure accountability and transparency in a firm. These elements lead to better financial performance and enhancement of long-term shareholder value (Bauwhede, 2009; Okereke et al., 2011).

Baktas and Kaymak (2009), Levine (2004), and Tumusiime-Mutebile (2012) posit that the governance system in banks is different from other non-financial corporate firms due to the unique characteristics of banks. Banks have unique characteristics such as being heavily leveraged and owing their liabilities to a large number of depositors who would be at a loss in case of bank failure. Additionally, the governance system in banking emphasizes the protection of the depositors' interests and the importance of veracity of financial information (Caprio & Levine, 2002; Macey & O'Hara 2003). This situation creates a difficulty in evaluating the quality of assets held by the banks and the corresponding financial position by outsiders due to information

asymmetry as far as the balance sheets of banks are concerned ((Baktas & Kaymak, 2009; Tumusiime-Mutebile, 2012). At the same time, Caprio and Levine (2002) argue that the investment value in banks depends on effective governance, which in turn leads to low cost of capital for bank borrowers. This is because efficiently governed banks incur lower costs in their operations. However, banks' governance is adversely affected by situations where bank managers have enormous discretion to act in ways that do not favour the interests of the stakeholders. Such a scenario might lead to inefficient allocation of capital hurting the overall bank performance (Caprio & Levine, 2002). Furthermore, regulation and supervision play an important complementary role in the governance of banks. As argued by Tumusiime-Mutebile (2012), the banking sector regulators and supervisors have interest in sound governance mechanisms in banks from the financial system stability perspective.

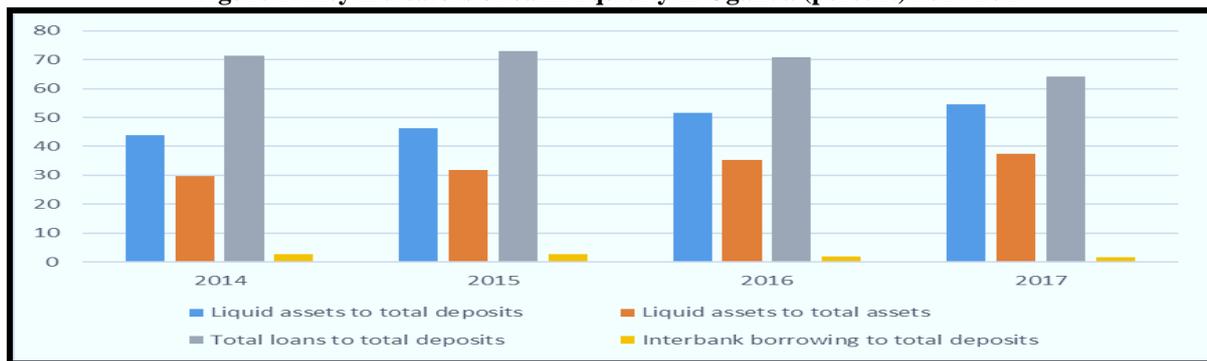
The statistics on commercial banks' performance in Uganda indicate that the banking system was safe and sound between 2014 and 2017. There was an overall growth in the ratios of liquid assets to total deposits and liquid assets to total assets. The figures for the ratios of liquid assets to total deposits, when compared to the minimum requirement of 20 percent, were very favourable. There was also a marked improvement in the total loans to total deposits ratios and interbank borrowing to total deposits ratios over the same period. Table 1 and Figure 2 present the statistics.

Table 1: Key indicators of bank liquidity in Uganda (percent) 2014-2017

Ratio	2014	2015	2016	2017
Liquid assets to total deposits	43.9	46.4	51.5	54.6
Liquid assets to total assets	29.7	31.7	35.3	37.4
Total loans to total deposits	71.4	73.1	70.8	64.1
Interbank borrowing to total deposits	2.6	2.7	2.0	1.5

Source: Bank of Uganda Annual Report 2017.

Figure 2: Key indicators of bank liquidity in Uganda (percent) 2014-2017



Justification for the Study.

The justification for the study is because Uganda is still a virgin area as far as studies on banks' governance structures are concerned. Effective governance structures are aimed at ensuring that banks perform to the expectations of the stakeholders. Since the banking sector plays important roles in financial intermediation and facilitation of a payment system in all economies, bank failures have a negative impact on the economic stability, banking sector, and stakeholders (Adnan et al., 2015; Hull, 2010). Previous studies have not investigated if there are statistically significant relationships between board composition, board size, audit committee independence, capital adequacy ratio, and commercial banks' performance in Uganda.

METHODOLOGY.

The research design adopted for this study is quantitative. Previous studies on internal and external governance structures have been predominantly quantitative (Duru et al., 2015; Fanta et al., 2013; James & Joseph, 2015; Liu et al., 2015; Mehrotra, 2016; Pandya, 2011; Salim et al., 2016; Zhou et al., 2016). A quantitative research design enables the collection and analysis of numerical data using procedures and statistical techniques to examine the relationships among variables (Creswell, 2014; Saunders et al., 2016; Sekaran & Bougie, 2014). This study employed a survey strategy to collect primary data from a population of 24 licensed commercial banks in Uganda at the time of the study, and the response rate was 87.50%. The researcher used a self-administered questionnaire with a 5-point Likert scale to collect primary data for the study. The research instrument Cronbach's reliability coefficient was established as 0.78 before the actual data collection took place.

The study applied partial correlation analysis to test the four study hypotheses after controlling for bank size and leverage. The justification for the choice of the partial correlational analysis method was on the basis that the study required the establishment of the strengths and direction of relationships between variables after controlling for the possible influence of the control variables on the bank performance variable (Creswell, 2014; Sekaran & Bougie, 2014). Microsoft SPSS was used to generate the zero-order and partial correlation matrices that were used to examine the influence in terms of direction, strength, and significance among the dependent and independent variables. Preliminary analyses using SPSS outputs were performed to ascertain that there was no

violation of the underlying assumptions of outliers, normality linearity, and homoscedasticity (Garson, 2012; Keith, 2006; Pallant, 2016).

1) Outliers Assumption- Compared the actual mean and the 5% trimmed mean for each variable of the study to ensure that there were no outliers in the data that was collected for the study as presented in Table 2.

Table 2: Comparison of the Actual Mean and 5% Trimmed Mean for Outliers Assumption

Variable	Actual Mean	5% Trimmed Mean	Difference
Board Composition	3.2857	3.2628	-0.0229
Capital Adequacy Ratio	3.2698	3.2637	-0.0061
Audit Committee Independence	3.0476	3.0529	0.0053
Board Size	3.1829	3.2023	0.0194
Leverage	3.7619	3.7897	0.0278
Bank Size	3.2697	3.2996	0.0299
Bank Performance	3.9143	3.9476	0.0333

The similarity of each pair of measures signified the absence of outliers in the data set. The assumption of outliers was also tested using box plots. For all the study variables there were no whiskers outside the boxes.

2. Normality Assumption - The Shapiro-Wilk's Test was used to ascertain whether the data for the study was normality distributed. The test yielded the results displayed in Table 3.

Table 3: Results for the Shapiro-Wilk Test for Normality.

Variable	Statistic	Degrees of Freedom	Significance
Board Composition	0.945	21	0.272
Board Size	0.950	21	0.503
Capital Adequacy Ratio	0.953	21	0.382
Audit Committee Independence	0.930	21	0.139
Leverage	0.910	21	0.058
Bank Size	0.943	21	0.253
Bank Performance	0.942	21	0.253

From Table 3 it is evident that all the significance values were more than 0.05 and the normality assumption was met. The study also applied the z-scores for skewness and kurtosis tests to establish the data normality. All the z-scores were in the interval -1.96 to +1.96, thereby satisfying the normality assumption.

3) The linearity and homoscedasticity assumptions were also tested by inspecting the scatter plot matrices from the SPSS output. They revealed a linear relationship between the dependent and independent variables and evenly distributed data points. Hence satisfying both assumptions.

RESULTS AND DISCUSSION OF FINDINGS.

In the Pearson Product-Moment Correlation matrices below the abbreviations represent the following: BP=Bank Performance, BC=Board Composition, BS=Board Size, ACI= Audit Committee Independence, CAR=Capital Adequacy Ratio, BaS=Bank Size, and LEV= Leverage.

Table 4: Zero-Order Pearson Product-Moment Correlations.

Variable	Statistic	BP	BC	BS	ACI	CAR	BaS	LEV
BP	Pearson Correlation	1.000						
	Sig. (1-Tailed)	-						
	N	21						
BC	Pearson Correlation	0.349**	1.000					
	Sig. (1-Tailed)	0.060	-					
	N	21	21					
BS	Pearson Correlation	0.369**	0.054	1.000				
	Sig. (1-Tailed)	0.050	0.408	-				
	N	21	21	21				
ACI	Pearson Correlation	-0.336**	0.133	-0.064	1.000			
	Sig. (1-Tailed)	0.068	0.282	0.392	-			
	N	21	21	21	21			

CAR	Pearson Correlation	-0.108	-0.274	0.281	0.396*	1.000		
	Sig. (1-Tailed)	0.321	0.115	0.108	0.038	-		
	N	21	21	21	21	21		
BaS	Pearson Correlation	0.234	-0.076	0.374*	-0.195	-0.168	1.000	
	Sig. (1-Tailed)	0.154	0.371	0.048	0.198	0.233	-	
	N	21	21	21	21	21	21	
LEV	Pearson Correlation	-0.296**	-0.037	0.213	0.675*	0.290	-0.133	1.000
	Sig. (1-Tailed)	0.097	0.436	0.177	0.000	0.101	0.283	.
	N	21	21	21	21	21	21	21

*Correlation significant at 5% level, **Correlation is significant at 10% level.

Table 5: Partial Pearson Product-Moment Correlations^a

Variable	Statistic	BP	BC	BS	ACI	CAR
BP	Pearson Correlation	1.000				
	Sig. (1-Tailed)	-				
	N	21				
BC	Pearson Correlation	0.381**	1.000			
	Sig. (1-Tailed)	0.054	-			
	N	21	21			
BS	Pearson Correlation	0.424*	0.107	1.000		
	Sig. (1-Tailed)	0.035	0.331	-		
	N	21	21	21		
ACI	Pearson Correlation	-0.169	0.206	-0.253	1.000	
	Sig. (1-Tailed)	0.244	0.198	0.148	-	
	N	21	21	21	21	
CAR	Pearson Correlation	0.004	-0.290	0.324	0.269	1.000
	Sig. (1-Tailed)	0.494	0.115	0.088**	0.132	-
	N	21	21	21	21	21

^a Bank Size and Leverage are the Control Variables.

*Correlation significant at 5%, **Correlation significant at 10%.

Ha₀ aimed to establish whether there was a statistically significant relationship between board composition and commercial banks' performance in Uganda. The study results in Table 5 revealed that there was a medium, positive and statistically significant partial correlation between bank performance and board composition after controlling for bank size and leverage, $r = 0.381$, $n=19$, $p < 0.1$, with high/low levels of bank performance being associated with high/low levels of board composition. Examination of the zero-order correlations in Table 4 for the same variable ($r = 0.349$) suggested that, after controlling for bank size and leverage, there was a mild effect of 3.2% increase in the strength of the relationship between bank performance and board composition. This finding contradictory to the empirical evidence of Bino and Tomar (2012), who found that there was a negative relationship between board composition and bank performance. However, the study results supported the earlier findings of Duru et al. (2015); Liu et al. (2015) and Zhu et al. (2016).

Hb₀ aimed to establish whether there was a statistically significant relationship between board size and commercial banks' performance in Uganda. The study results in Table 5 revealed that there was a medium, positive and statistically significant partial correlation between bank performance and board composition after controlling for bank size and leverage, $r = 0.424$, $n=19$, $p < 0.05$, with high/low levels of bank performance being associated with high/low levels of board size. However, inspection of the zero-order correlations in Table 4 ($r = 0.369$) suggested that after controlling for bank size and leverage, there was a sizable effect of a 14.9% increase in the strength of the relationship between bank performance and board size.

The moderate and significant positive relationship between board size and bank performance further supports the work of Johl et al. (2015), Kyereboah and Biekpe (2006) since they found a statistically significant positive relationship between these variables. However, the evidence from this study contradicted the work of Adusei (2011); Pathan and Faff (2013) and Staikouras et al. (2007), who found that board size had a negative influence bank performance. The positive correlation between board size and bank performance for this study implies that there is a direct relationship between board size and commercial banks' performance in Uganda. Board size being an internal governance structure, one would expect a large board size to have a significant relationship to bank performance due to a large pool of human capital with extensive knowledge, experience, and capacity to monitor management (Johl et al., 2015). On the other hand, a small board size would make the banks incur reduced agency costs, experience less coordination problems, and make critical decisions expeditiously, demonstrating effective governance and protection of shareholder value (Chou & Buchdadi, 2017).

For Hc₀ the aim was to establish whether there was a statistically significant relationship between audit committee independence and commercial banks' performance in Uganda. The study results in Table 5 showed that there was a weak, negative, and statistically non-significant partial correlation at a 5% level of significance between bank performance and audit committee independence after controlling for bank size and leverage, $r=-0.169$, $n=19$, $p = 0.241$. Low levels of bank performance were

associated with high levels of audit committee independence. Examination of the zero order correlations in Table 4 ($r = -0.336$) suggested that, after controlling for bank size and leverage there was a sizable effect of 49.7% decrease in the strength of the relationship between bank performance and audit committee independence. The negative correlation coefficient between the two variables implied that the audit committee independence has adverse effects on bank performance. This study outcome supports the work of Zábajníková (2016), who came up with similar results in her study of the relationship between the independent audit committee and firm performance. However, the study results are inconsistent with the study findings of Chou and Buchdadi (2017) and Fanta et al. (2013), who found that audit committee independence had a positive influence on bank performance.

The purpose H_{d0} was to establish whether there was a statistically significant relationship between capital adequacy ratio and commercial banks' performance in Uganda. The study results in Table 5 revealed weak, positive, and statistically non-significant partial correlation at a 5% level of significance between bank performance and capital adequacy ratio, after controlling for bank size and leverage, $r = 0.004$, $n=19$, $p = 0.494$. Low/high levels of bank performance were associated with low/high levels of capital adequacy ratio. Examination of the zero-order correlations in Table 4 ($r = -0.108$) suggested that, after controlling for bank size and leverage, this resulted in a 96.3% decrease in the strength of the relationship between bank performance and capital adequacy ratio. This result reinforces the works of Kipruto et al. (2017) and Umoru and Osemwegie (2016), who found a positive relationship between the two variables. On the contrary, James and Joseph (2015) found a negative correlation between capital adequacy ratio and bank performance.

CONCLUSIONS

Table 6: Summary of Test Results

Variable of Study	Mean	SD	95% Conf. Int.		Test Statistic	Sig. 1-Tail	Null Hypothesis	Reject Hypothesis?
			Lower	Upper				
Board Comp.	3.29	0.75	2.95	3.63	1.77	0.054	H_{a0}	Yes
Board Size	3.18	1.07	3.39	4.14	0.77	0.035	H_{b0}	Yes
Audit Com. Ind.	3.27	1.24	2.48	3.61	0.18	0.241	H_{c0}	No
Cap Adeq. Ratio	3.05	0.58	3.04	3.50	2.21	0.494	H_{d0}	No

Table 6 presents a summary of the test results for the study leading to the following study conclusions.

1. There was a statistically significant medium and positive relationship between board composition and commercial banks' performance in Uganda. The null H_{a0} hypothesis is therefore rejected.
2. Therefore, there was a medium, positive and a statistically significant relationship between board size and commercial banks' performance in Uganda. The null H_{b0} hypothesis is therefore rejected.
3. Therefore, there was a non-statistically significant negative relationship between audit committee independence and commercial banks' performance in Uganda. The null H_{c0} hypothesis is therefore not rejected.
4. Therefore, there was a non-statistically significant relationship between capital adequacy ratio and commercial banks' performance in Uganda. The null H_{d0} hypothesis is therefore not rejected.

RECOMMENDATIONS.

Sustainable performance of commercial banks in Uganda hinges on effective governance structures such as board composition, board size, audit committee independence, and capital adequacy ratio. The author recommends that the Bank of Uganda as the regulator and supervisor of banks and other financial institutions in Uganda, should ensure that the above financial and non-financial characteristics are strictly adhered to. This arrangement will ensure effective internal and external governance structures, thereby enhancing bank performance in Uganda.

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Identify COVID-19 from chest X-ray images by Artificial Intelligence

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Abstract- Artificial intelligence is a breakthrough in technology. Artificial intelligence provided many services in various fields, especially in the field of medicine, where he anticipated the epidemic and presented many solutions to our help in overcoming it. I was able to develop a project to obtain the highest accuracy in identifying people affected by Covid-19.

Seeking the best and cheapest way to diagnose individuals with COVID-19 infections or suspects. Or finding new viral and bacterial pneumonia (MERS, SARS, and ARDS). In Egypt (Developing Countries), the polymerize chain reaction (PCR) test takes around 48 hours to get the result, and the result isn't always accurate and costs a lot of money in the range of 1000 – 2000, so many people can't afford it. Also, these tests aren't available in many governments so people could die for not having these tests, Also, due to the huge amount of infected people, there's a lack of medicine in the local pharmacies.

Due to the lack of medicine, wrong clinical diagnosis by some doctors, and the enormous amount of money that the country spends on tests and medications, we decided to create a web application that uses Deep Learning and Artificial intelligence algorithms to analyze " CT chest - Chest X-ray " for suspected individuals and getting the results immediately and efficiently.

Index Terms- Artificial Intelligence, deep neural network Machine Learning, COVID-19, CT chest, Chest X-ray, Deep Learning, Data Science, Algorithms, Egypt, Polymerise chain reaction (PCR), Developing Countries.

INTRODUCTION

Artificial intelligence systems had previously observed the unknown form of pneumonia in the People's Republic of China before the world had even become aware of the threat posed by the coronavirus (COVID-19). Since the epidemic has now become a global pandemic, AI tools and technology will help policymaking, the medical community, and society as a whole navigate each stage of the crisis and its consequences: identification, preventing, responding, recovering, and accelerating science.

AI technologies and methods can help policymakers and the healthcare community understand COVID-19 viruses and expedite therapy research through rapid analyzes of detailed research data. Text mining instruments for AIs and data can

reveal the history of the virus, transmission and diagnosis, management measures, and the lessons of earlier epidemics.

I. Problem

Seeking the quickest and cheapest route for an investigator, COVID-19-infected person (MERS, SARS, and ARDS) or suspected COVID-19-pulmonary person where Egypt did not take modern technology to monitor patients because there is minimal technology across the globe to achieve the precise result, so Egypt turned to an alternative solution like polymerize chain reaction (PCR), The analysis is carried out by taking a blood sample from the suspect who is infected with the virus, and the result will appear within two days of the procedure and it is expensive and, limited in Governments after we conformed from an online social survey where we found the minimum to releases the results are two days and the cost in the range from 1000 to 2000, and it isn't accurate where it Shows positive results in 30% of cases Coronavirus, and this percentage it is lower than anther tests.

There are three kinds for testing are, the first Polymerise Chain Reaction (PCR), it is available in many countries but it very Expensive, and take a long time to see the result, and accurate by 30%, the second type is CDC tests are provided to U.S. state only and local public health laboratories and Department of Defense laboratories that were either previously qualified for being able to perform a similar type of test used to detect influenza or have been recently approved by their state public health laboratory for SARS-CoV-2 and COVID disease testing. the third is FDA tests, there are a group of tests like Diagnostic test, viral test, molecular test, nucleic acid amplification test (NAAT), RT-PCR test, LAMP test, and it didn't available in a lot of locations and the period to get the result from one day (some locations) or up to a week, and it very expensive, so we start to find another solution solve disadvantages of the three tests, to cheap and available in all Countries, and get the result in the current time, get the result in the current time, and there are many types of testing but it is common.

trying to find another way More Accurate, Cheaper than PCR by building an AI website application use a public open dataset of chest X-ray and CT images of patients which are positive or suspected of COVID-19 or other viral and bacterial pneumonia (MERS, SARS, and ARDS.) as shown in figure (1).



With the Chest X-Ray dataset, develop a Machine Learning Model to classify the X Rays of Healthy vs Pneumonia (Corona) affected patients & this model powers the AI application to test the Corona Virus in Faster Phase Data will be collected from public sources as well as through indirect collection from hospitals and physicians, where Corona - COVID19 virus affects the respiratory system of healthy individual & Chest X-Ray which is shown in figure (2) is one of the important imaging methods to identify the coronavirus.



II. Background

In the context of a COVID-19 pandemic, we want to improve prognostic predictions to triage and manage patient care. Data is the first step to developing any diagnostic/prognostic tool. While there exist large public datasets of more typical chest X-rays from the NIH [Wang 2017], Spain [Bustos 2019], Stanford [Irvin 2019], MIT [Johnson 2019] and Indiana University [Demner-Fushman 2016], there is no collection of COVID-19 chest X-rays or CT scans designed to be used for computational analysis.

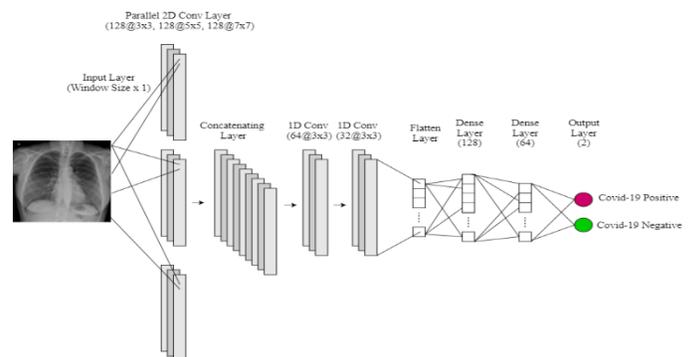
The 2019 novel coronavirus (COVID-19) presents several unique features Fang, 2020, and Ai 2020. While the diagnosis is confirmed using polymerase chain reaction (PCR), infected patients with pneumonia may present on chest X-ray and computed tomography (CT) images with a pattern that is only moderately characteristic for the human eye Ng, 2020. In late January, a Chinese team published a paper detailing the clinical and paraclinical features of COVID-19. They reported that patients present abnormalities in chest CT images with most having bilateral involvement Huang 2020. Bilateral multiple lobular and subsegmental areas of consolidation constitute the typical findings in chest CT images of the intensive care unit (ICU) patients on admission Huang 2020. In comparison, non-ICU patients show bilateral ground-glass opacity and subsegmental areas of consolidation in their chest CT images Huang 2020. In these patients, later chest CT images display bilateral ground-glass opacity with resolved consolidation Huang 2020.

This information from [Ieee8023/covid-chestxray-dataset](https://www.ijerph.com/ijerph8023/covid-chestxray-dataset).

III. Idea

First, identify the problem which conformed by the online survey and try to solve it by creating new idea solve the disadvantage of the main problem as we explained before, I develop an AI web application by that using Deep Learning and Artificial intelligence to analyze " CT chest - Chest X-ray " by using datasets which X-ray images obtained from two different sources were used for the diagnosis of COVID-19. A COVID-19 X-ray image database was developed by Cohen JP using images from various open access sources.

This database is constantly updated with images shared by researchers from different regions, to can define if the input is Xray for chest or not by learning the stats of PA, AP, and AP Supine views, and use Convolutional type Neural Network to identify Covid-19 positive patients using X-Ray images, then deploy the previously CNN model and Training the CNN, and create Convolutional Neural Network Architecture, The model is sensitive in detecting pneumonia disease. Although the model can predict pneumonia positively and marked as no findings in the dataset.



In a web application using a Python backend with a Flask web development framework and other Modules like TensorFlow, Keras, and OpenCV modules to connect ipynb with python then Create the data set and connected it by the database for Positive X-Ray images the data Database collected from Joseph Paul Cohen. Postdoctoral Fellow, Mila, the University of Montreal for the dataset below for corona dataset & 80% dataset collected from different sources like IEEE COVID-chestx-ray-dataset and Kaggle Corona Hack -Chest X-Ray-Dataset, then after finished the backend connected it with The frontend of the website is created with HTML and JavaScript and use some library like Bootstrap, and jQuery.

IV. Conclusion

In this study, we have proposed a deep learning-based model to detect and classify COVID-19 cases from X-ray images. Our model is fully automated with an end-to-end structure without the need for manual feature extraction. Our developed system can perform binary and multi-class tasks with accuracy in the range of 98.08% to 87.02%, respectively. Expert radiologists assess the efficiency of the built model and can

compare it with a larger database. This program can be used to resolve the scarcity of radiologists at remote sites in countries affected by COVID-19. These models may also be used to treat other chest diseases such as tuberculosis and pneumonia. The use of a small number of COVID-19 X-ray images is a drawback of the study. With more photos from our local hospitals, we plan to make our model more reliable and accurate.

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Nexus between CO₂ emission and GDP in USA, China, India and Japan: Panel Cointegration and Vector Error Correction Model.

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Abstract- In this paper author tried to show the relationship between CO₂ emission and GDP in panel data during 1960-2016 for four economies namely, USA, China, India and Japan through the methodology of fixed effect panel regression, Fisher-Johansen cointegration and vector error correction model with hypothesis of decoupling to justify EKC. The paper found that one per cent increase in GDP of USA, China, India and Japan led to 0.445 per cent increase in CO₂ emission per year significantly during 1960-2016 in the fixed effect model of panel regression. In the decoupling model under panel regression during the same period it was found that the elasticities of CO₂ emission with respect to GDP, GDP², GDP³ and GDP⁴ were -8.94, 2.45, -0.262 and 0.0098 respectively all of which are significant at 5% level. It indicates that EKC is inverted N shaped. Panel cointegration among log value of CO₂ emission and log values of GDP, GDP², and GDP³ showed three cointegrating equations where VECM is stable, nonstationary, non-normal and having serial correlation problems. There is no short run causality running from GDP, GDP², GDP³ respectively on CO₂ emission but there is long run causality running from GDP and GDP³ on CO₂ emission in which one of three error correction is converging significantly towards equilibrium with the speed of adjustment at the rate of 9.98% per annum.

Index Terms- CO₂ emissions, GDP, time-varying coefficient cointegration, VECM, short run causality, long run causality, EKC hypothesis, decoupling

JEL Classification Codes C14; C32; Q01; Q43; Q52; Q53; Q56

I. INTRODUCTION

The relationship between CO₂ emissions- the main gas responsible for global warming, and economic growth is among the most studied themes of environmental economics. Reducing overall emissions while keeping a high pace of economic development is at the heart of the notion of sustainable development. The relationship between economic growth and CO₂ emissions has been the subject of intense research over the past few decades. Many countries have been facing a major challenge, namely, to ensure stable economic growth and to protect the environment. The increase of CO₂ emissions is the major factor in

the climate change threat. Economic growth of countries impels an intensive use of energy which results in growing

CO₂ emissions, so pollution is directly linked with economic growth and development. On the other hand, economic growth and development result in introduction of new energy-saving and low-carbon technologies that displace the old, energy- and carbon-intensive ones.

There's a debate about whether growth can drive or even coexist with climate stabilization. On the other side of the coin, it's also a discussion of whether climate stabilization can drive growth. While the relationship between growth and resource is a complex one. When emissions cease to increase or even decline while the economy grows it is referred to as decoupling. More precisely, if emissions grow less rapidly than economic growth, it is a situation of relative decoupling. When they instead decline while the economy grows, that can be said of absolute decoupling. This is ultimately the goal of any climate agreement. The environmental and energy economics literature has long been interested in the empirical study of decoupling of emissions from GDP and in the strictly related concept of the Environmental Kuznets Curve (EKC)(1955), whereby as income grows relative decoupling turns into absolute after some income turning point. The empirical evidences of decoupling vary from country to country, region to region with respect to time. If the period of studies is taken for long years then there is possibility of acceptance of EKC.

II. REVIEW OF LITERATURE

Several economic literatures are available on the relation between emission and GDP or growth but a few literatures are available on decoupling analysis under panel cointegration and VECM perspectives. Author studied some important researches which are related to this paper. Martinez-Zarzoso and Bengochea-Morancho (2004) extended the functional form to cubic specification in addressing the relationship between CO₂ and GDP for 22 OECD (Organisation for Economic Co-operation and Development) countries for the period 1975-1998. The cubic function indicated that a decline in CO₂ emissions when income is rising can be expected, but only up to a certain level, and then an increase of pollution can be expected again at higher incomes. Kristrom and Lundgren (2005) studied CO₂ emissions in Sweden since 1900. They single out the use of long time series as the "key

contribution” of their paper and discussed the advantages of studying emissions “through several phases of development” instead of relying solely on “short panel data sets”. They estimated the trend in emissions over long windows (1900-99) and shorter ones (1970-99) to see how the trend behavior has changed over time. Mehrara (2007) studied the causality issue between energy consumption and economic growth for Iran, Kuwait, and Saudi Arabia. The results show a unidirectional long-run causality from economic growth to energy consumption for Iran and Kuwait, and unidirectional strong causality from energy consumption to economic growth for Saudi Arabia. Lean and Smyth’s (2010) Vector Error-Correction Model analysis for five ASEAN (Association of Southeast Asian Nations) countries over the period of 1980–2006 was based on quadratic specification. They concluded, among other, that there is a statistically significant non-linear relationship between emissions and economic growth in support of EKC. Kumar (2011) examined the causality in both static and dynamic framework between energy consumption, CO₂ emissions and economic growth in India using Granger approach in VAR framework. He found from the VAR analysis that energy consumption, capital and population Granger-cause economic growth not the vice versa. Impulse Response Functions and Variance Decomposition analysis results indicate that CO₂ emissions has positive impact on energy use and capital but negative impact on population and GDP. Energy consumption has positive impact on CO₂ emissions and GDP but its impact is negative on capital and population.

Ru, Chen and Dong (2012) divided target research stage (1960-2008) into 5 sub-time periods, that is 1960-1969, 1970-1979, 1980-1989, 1990-1999, 2000-2008, then inspected the relationship among GDP per capita, carbon emissions and intensity of carbon emissions in China. Based on Daly’s dematerialization theory (1990) and income elasticity theory, authors analyzed relationship between China’s economic development and environmental pressures which are presented by carbon emissions from 1960 to 2008. The major findings are:

[i] On the terms of 5 sub-time periods, absolute dematerialization occurred in 1960-1969, materialization occurred in 1970-1979, relative dematerialization occurred in 1980-1989, 1990-1999 and 2000-2008. [ii] On the terms of the whole period, relative dematerialization is occurred in 1960-2008. [iii] From 1960 to 2008, income elasticity of carbon emissions is 0.59 and income elasticity of carbon emissions’ intensity is -0.34, income elasticity of environmental pressures is 0.84, which means that when economic growth changes 1%, carbon emissions, carbon emissions’ intensity and environmental pressures changes 0.59%, -0.34% and 0.84% respectively, which shows that the relationship of environmental pressures and economic development, carbon emissions and economic development are relative decoupling.

Arouri et al (2012) provided similar analysis and results for 12 MENA (Middle East and North Africa region) countries over the period 1981–2005. However, having found that single EKC turning points considerably vary across the countries, they expressed concerns regarding the validity of conclusions stemming from the panel analysis. Mert and Bozdag (2013) found that the relationship between GDP and CO₂ emission was inverted N shaped for Bosnia and Herzegovina during 1992-2009. The relation between per capita GDP and per capita CO₂ emission was found as monotonically increasing linear function. Kapusuzoglu

(2014) used variance decomposition within cointegration analysis to provide similar evidence on the causality from CO₂ emissions to GDP in developing economies, but not in OECD and European countries. Alshehry and Belloumi (2015) investigated the dynamic causal relationships among energy consumption, energy price, and economic activity in Saudi Arabia, using a Johansen multivariate cointegration approach. The results indicate that there exists at least a long-run relationship between energy consumption, energy price, carbon dioxide emissions, and economic growth. Kasperowicz (2015) used the panel data approach to investigate the relationship between CO₂ emissions and economic growth for 18 EU Member Countries from 1995 to 2012. Using basic ECM estimation the paper verified that the long-run relationship between GDP and CO₂ emissions is negative, because the development of new low-carbon technologies enables in the long-run reaching the same production level at lower CO₂ emissions and that the short-run relationship between GDP and CO₂ emissions is positive, because the fast increase in production can be reached due to more intensive energy use by the existing technologies, then the capacity increases as well CO₂ emissions. Liddle and Messinis (2016) using the linear cointegration method with endogenous breaks investigated the CO₂ emissions-GDP relationship for 21 OECD countries over a very long period 1870-2010 utilizing panel FMOLS and DOLS methods. An inverted-U pattern is found for Denmark, France, Switzerland and UK; a positive, less than unity income elasticity for Italy and Norway (termed “saturation”), a near zero elasticity for Belgium, and a unitary elasticity (“no transition”) for Spain. Cederborg and Suobohm (2016) conducted 69 industrial countries and 45 poor countries in cross section data in 2012 to find the relationship between per capita GDP and per capita emission which is positive but had no turning point to decline. Mir and Storm (2016) studied 40 countries and 35 industries during 1995-2007 to estimate per capita CO₂ emission and per capita GDP. It supports EKC pattern for production-based CO₂ emission but not support consumption-based CO₂ emission. There is no automatic decoupling between growth and emission which implies to give up EKC hypothesis. To fix 2°C, it needs to check consumption and production patterns. The study of Cederborg and Snöbohm (2016) conducted on 69 industrial countries as well as 45 poor countries using cross-sectional data. The empirical result of the cross-sectional study implies that there is in fact a relationship between per capita GDP and per capita carbon dioxide emissions. CO₂ emissions increase as a result of economic growth. The negative correlation between CO₂ emissions and GDP per capita squared suggests a possible polynomial form similar to the inverse U-shape of the EKC. The coefficient is significant in all models although the level of significance varies. The size of the coefficient however is very small, which suggest the impact of the negative correlation after the possible turning point is fractional. A 1-dollar increase in per capita GDP after the turning point would, according to the results, cause a decrease in CO₂ emissions by 1.44965e-09 tons (1.44965 mg) per capita. The results provided for GDP per capita suggest CO₂ emissions increase by approximately 0.0002 tons (0.2 kg) per capita when GDP per capita increase by 1 dollar, holding all other variables constant. Magazzino and Elliott (2016) examined the relationship among real GDP, CO₂ emissions, and energy use in the six Gulf Cooperation Council (GCC) countries using annual data for the years 1960–2013. The results significantly reject the

assumption that energy is neutral for growth. A decrease in energy consumption causes a decrease in real GDP. In this case, the economy is called “energy dependent,” and energy conservation policies may be implemented with adverse effects on real GDP. Therefore, if energy uses Granger-causes economic growth, then energy conservation policies aiming at protecting the environment are expected to deteriorate the current stage of economic growth. Beser and Beser (2017) studied the relationship between total energy consumption and carbon dioxide (CO₂) emissions under the Environmental Kuznets Curve (EKC) framework based on the data in Turkey during 1960-2015. The overall results indicate that EKC is valid, besides, energy conservation policies and controlling CO₂ emissions are likely to have adverse effect on the real output growth of Turkey. According to the results combined both long run and short run, authors see that CO₂ emissions and national income has positive and significant role energy consumption for Turkey. The significant lagged error-correction terms obtained from Models also support the long run relation among relevant variables. Thus, authors conclude that CO₂ emissions and national income have a significant and positive impact on energy consumption which makes the feedback hypothesis valid for Turkey. Lise (2006) concluded that the relation between CO₂ emissions and income in Turkey is linear rather than quadratic and does not support the EKC hypothesis. In contrast, Ang (2008) found a long-run positive dependence between pollution and energy consumption using a VAR approach for EKC model for Turkey. Furthermore, Soytaş and Sari (2009) investigated the long-run Granger causality relationship between economic growth, CO₂ emissions and energy consumption in Turkey. The empirical findings suggest the existence of Granger causality running from carbon emissions to energy consumption, but only one way and in this direction.

Mitić, Ivanović and Zdravković (2017) analyzed the relationship between real GDP and CO₂ emissions for 17 transitional economies based on a series of annual data from 1997 to 2014. They conducted Dynamic Ordinary Least Squares (DOLS) and Fully Modified OLS (FMOLS) approaches. The results clearly suggest the existence of a statistically significant long-run cointegrating relationship between CO₂ emissions and real GDP. A 1% change in GDP leads to around a 0.35% change of CO₂ emission on average for the considered group of countries. Close values of long-run coefficients for all estimations confirm the robustness of the estimated results. The authors state that transitional economies need to follow global policy incentives, and try to implement new mechanisms and instruments for the purpose of reducing CO₂ emissions, such as environmental taxes, emissions-trading schemes, and carbon capture and storage, if they want to achieve future CO₂ emission reductions, while attaining economic growth. Long-run cointegrating relationship between CO₂ emissions and real GDP that is statistically significant. For all four versions of estimations the observed calculated coefficient was approximately 0.35, which means that, on average, a 1% change in GDP leads to a 0.35% change in CO₂ emission for the considered group of countries. Close values of long-run coefficients for all estimations confirm the robustness of the estimated results. Furthermore, it is necessary to state that this result does not explain the factors behind the observed CO₂-GDP relationship.

Mikayilov, Hasanov and Galeotti (2018) allow the income elasticity of emissions – a critical metrics for the study of decoupling – to vary over time. The reason is that the elasticity might change through the time due to the factors affecting the drivers of the CO₂ emissions. Authors use a time-varying coefficients cointegration approach to investigate the CO₂ emissions-GDP relationship for 12 Western European countries over a long period ranging from 1861 to 2015. The main finding is that the income elasticities of CO₂ emissions are found to be positive in all investigated countries. In addition, authors find evidence in favor of relative decoupling – emissions increasing more slowly than GDP – in 8 out of the 12 European countries. The remaining 4 cases the income elasticities of CO₂ emissions are in excess of unity. In nearly half of cases the analysis confirms a statistically significant time-varying pattern for the income elasticities. Cohen, Jalles, Loungani and Marto (2018) studied 20 countries during 1990-2014 to investigate the decoupling of emissions and growth and found the average trend elasticity, viz. the response of trend emissions to a 1 percent change in trend GDP, is 0.4. For the advanced economies within this group, the elasticity averages zero. Some countries have negative elasticities, suggesting that they had made progress in decoupling their trend emissions from trend GDP. Consumption-based emissions weakens the case for progress but does not overturn it. Encouragingly, authors found suggestive evidence that trend elasticities could be lowered through policy efforts on the part of countries. Moreover, the investigation of the historical relationships between emissions and GDP showed that elasticities in recent decades were considerably lower than in previous decades.

III. Objective of the paper

In this paper author tried to show the relationship between CO₂ emission and GDP among four countries e.g. USA, China, India and Japan through fixed effect panel regression, panel cointegration and vector error correction models during 1960-2016 with the hypothesis of decoupling to justify the Environment Kuznets Curve in the form of inverted U or N shaped. The short and long run association between CO₂ emission and GDP with higher order were also the aim of analysis of the paper.

I. Methodology and source of data

To find the relationship between CO₂ emission in Kilo ton and GDP in billion US\$ in current prices during 1990-2016, author used fixed effect panel regression model after verifying the Hausman Test (1978). Fisher (1932)-Johansen cointegration test (1991) was used to show cointegration. Johansen (1991) Panel VECM was also used to show long and short run association between CO₂ emission and GDP where Wald test (1943) was verified in the short run causality.

Data of CO₂ emission in kilo ton and GDP in billion US\$ in current prices for USA, China, India and Japan from 1960 to 2016 were taken from the World Bank.

II. Findings of the econometric models

Regression analysis of Panel data of CO₂ emission in Kilo ton and GDP in current US\$ of USA, China, India and Japan during 1960-2016 in the random effect model showed that one per cent increase in GDP per annum led to 0.445 per cent increase in

the CO₂ emission per annum significantly in which Hausman test was accepted for regression due to $\chi^2(4)=0.168208$ whose prob=0.6817.

$$\text{Log}(x_1) = 11.16289 + 0.445532 \log(y_1) + u_i$$

(88.27)* (24.47)*

R²=0.88, F=430.52*, AIC=0.93, SC=1.008, DW=0.349 where x₁=CO₂ emission in kilo ton, y₁=GDP in current prices in billion US\$, *=significant at 5% level.

Most of the researchers, now-a-days agreed that CO₂-GDP relation is polynomial which is given below.

$$\text{Log}(x_1) = a_0 + a_1(\log y_1) + a_2(\log y_1)^2 + a_3(\log y_1)^3 + a_4(\log y_1)^4$$

Here, random effect model for regression is rejected because Hausman test (1978) is rejected since $\chi^2(4)=17.856518$ whose prob=0.0013 so that fixed effect model for regression was applied where the estimated equation is shown below.

$$\text{Log}(x_1) = 23.40711 - 8.942610(\log y_1) + 2.452342(\log y_1)^2 - 0.262413(\log y_1)^3 + 0.009849(\log y_1)^4$$

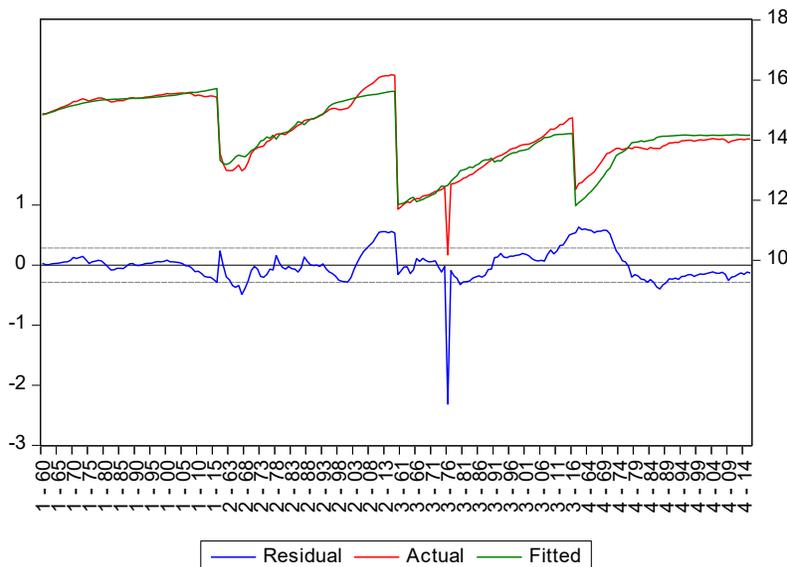
(4.66)* (-2.75)* (3.22)* (-3.404)*
(3.45)*

R²=0.936, F=465.77*, AIC= 0.36, SC=0.48, DW=0.62, where it was assumed that $\Delta \log x_1 / \Delta \log y_1 > 0$ in relative decoupling and $\Delta \log x_1 / \Delta \log y_1 < 0$ in absolute decoupling when Environment Kuznets Curve is inverted U or N shaped.

In the above fitted model all the coefficients are significant at 5% level with high R² and F but with low DW.

In Figure 1, the inverted N shaped curve in four cross section data have been partially visible.

Figure 1: Inverted N shaped Kuznet curve



Source-Plotted by author

Panel causality between CO₂ emission and GDP in four countries during 1960-2016 in Granger Causality test with lags-2 confirmed that GDP does Granger cause CO₂ emission but not vice versa. In Table 1, it is shown clearly.

Table 1: Causality test

Null Hypothesis	Observations	F statistic	Probability
Log y ₁ does not Granger cause log x ₁	220	3.51730	0.0314
Log x ₁ does not Granger cause log y ₁		2.76842	0.0650

Source-Calculated by author.

Johansen-Fisher Panel unrestricted rank cointegration test between CO₂ emission and GDP in cubic form of 4 top emitter countries (USA, China, India, Japan) during 1960-2016 taking linear deterministic trend with lag 1 assured that both Trace statistic and Max Eigen statistic contain three significant cointegration equations.

Table 2: Panel cointegration

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob
None	105.6	0.0000	95.08	0.0000
At most 1	40.35	0.0000	26.60	0.0008
At most 2	19.95	0.0105	16.64	0.0341
At most 3	10.55	0.2288	10.55	0.2288

* Probabilities are computed using asymptotic Chi-square distribution, Source-Calculated by author

The three cointegrating equations are given below.

$$[1] EC_{1t-1} = \log x_{1t-1} - 0.004671 \log y_{1t-1}^3 + 0.00756t - 13.309$$

(-5.81)* (3.52)*

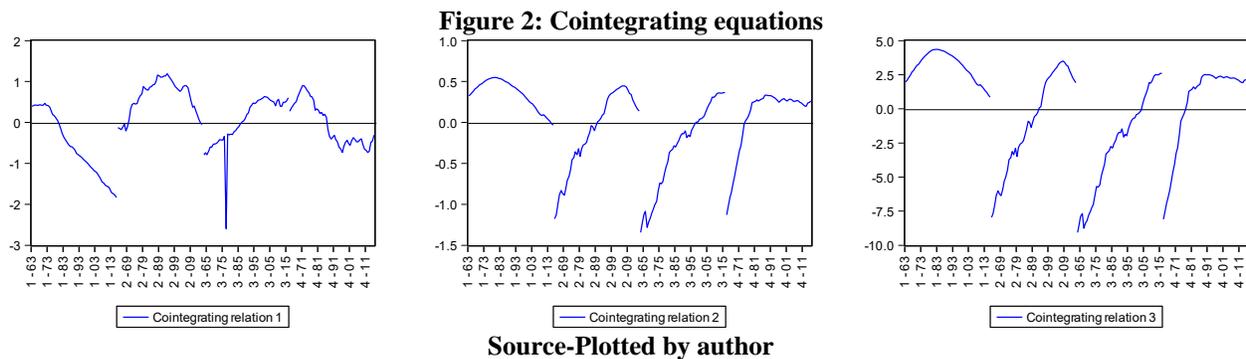
$$[2] EC_{2t-1} = \log y_{1t-1} - 0.005435 \log y_{1t-1}^3 - 0.001197t - 4.6498$$

(22.14)* (-1.82)*

$$[3] EC_{3t-1} = \log y_{1t-1}^2 - 0.081894 \log y_{1t-1}^3 - 0.010339t - 17.498$$

(-42.28)* (-1.99)*

In Figure 2, the cointegrating equations have been plotted clearly where first cointegrating equation is stationary and others are nonstationary.



The estimated equations of the VECM are given below.

$$[1] \Delta \log x_{1t} = -0.02722 EC_1 + 0.760049 EC_2 - 0.105244 EC_3 - 0.58954 \Delta \log x_{1t-1} - 0.02315 \Delta \log x_{1t-2}$$

(-0.84) (2.03)* (-2.10)* (-8.24)* (-3.37)*

$$+ 5.0579 \Delta \log y_{1t-1} - 1.1626 \Delta \log y_{1t-2} - 0.6806 \Delta \log y_{1t-1}^2 + 0.0906 \Delta \log y_{1t-2}^2 + 0.03103 \Delta \log y_{1t-1}^3$$

(1.66) (-60.42)* (-1.37) (0.19) (1.20)

$$- 0.00032 \Delta \log y_{1t-2}^3 + 0.040266$$

(-0.013) (1.93)*

R²=0.319, F=8.71, AIC=-0.39, SC=-0.204, *=significant at 5% level

Therefore, $\Delta \log x_{1t}$ is significantly negatively related with $\Delta \log x_{1t-1}$, $\Delta \log x_{1t-2}$, and $\Delta \log y_{1t-2}$.

EC₃ is significantly moving towards equilibrium correcting error at the rate of 10.52 per cent per year. (visible in first diagram in Figure 2).

$$[2] \Delta \log y_{1t} = 0.0425 EC_1 - 0.1943 EC_2 + 0.0225 EC_3 - 0.0374 \Delta \log x_{1t-1} - 0.0138 \Delta \log x_{1t-2}$$

(3.14)* (-1.27) (1.105) (-1.28) (-0.49)

$$+ 0.8258 \Delta \log y_{1t-1} - 1.7009 \Delta \log y_{1t-2} - 0.1314 \Delta \log y_{1t-1}^2 + 0.3040 \Delta \log y_{1t-2}^2 + 0.00857 \Delta \log y_{1t-1}^3$$

(0.66) (-1.50) (-0.64) (1.62) (0.81)

$$- 0.0165 \Delta \log y_{1t-2}^3 + 0.05797$$

(-1.67) (6.83)*

R²=0.19, F=4.60, AIC=-2.18, SC=-1.99

Therefore, $\Delta \log y_{1t}$ is insignificantly related with all and the EC₂ is insignificantly approaching equilibrium correcting error at the rate of 19.43 % per year.

$$\begin{aligned}
 [3] \Delta \log y_{1t}^2 = & 0.55699 EC_1 - 2.5879 EC_2 + 0.3515 EC_3 - 0.4341 \Delta \log x_{1t-1} - 0.1675 \Delta \log x_{1t-2} \\
 & (3.11)^* \quad (-1.28) \quad (1.29) \quad (-1.12) \quad (-0.45) \\
 & + 9.4121 \Delta \log y_{1t-1} - 17.4825 \Delta \log y_{1t-2} - 1.7553 \Delta \log y_{1t-1}^2 + 3.2127 \Delta \log y_{1t-2}^2 + 0.1294 \Delta \log y_{1t-1}^3 \\
 & (0.57) \quad (-1.17) \quad (-0.65) \quad (1.29) \quad (0.92) \\
 & - 0.1783 \Delta \log y_{1t-2}^3 + 0.7296 \\
 & (-0.1.36) \quad (6.49)^*
 \end{aligned}$$

$R^2=0.226$, $F=5.44$, $AIC=2.98$, $SC=3.17$

Therefore, $\Delta \log y_{1t}^2$ is insignificantly related with all and the EC_1 is significant but positive and divergent.

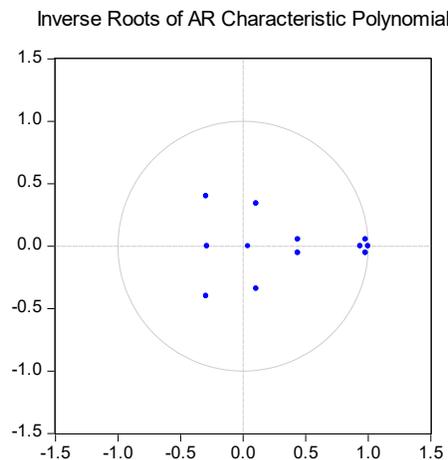
$$\begin{aligned}
 [4] \Delta \log y_{1t}^3 = & 5.8391 EC_1 - 32.6097 EC_2 + 4.810 EC_3 - 3.994 \Delta \log x_{1t-1} - 1.5619 \Delta \log x_{1t-2} \\
 & (2.99)^* \quad (-1.48) \quad (1.62) \quad (0.94) \quad (-0.387) \\
 & + 116.506 \Delta \log y_{1t-1} - 144.4299 \Delta \log y_{1t-2} - 23.8644 \Delta \log y_{1t-1}^2 + 27.1459 \Delta \log y_{1t-2}^2 + 1.7839 \Delta \log y_{1t-1}^3 \\
 & (0.065) \quad (-0.88) \quad (-0.81) \quad (1.004) \quad (1.17) \\
 & - 1.5302 \Delta \log y_{1t-2}^3 + 7.2977 \\
 & (-1.07) \quad (5.95)^*
 \end{aligned}$$

$R^2=0.279$, $F=7.18$, $AIC=7.76$, $SC=7.94$

Therefore, $\Delta \log y_{1t}^3$ is also insignificantly related with all but EC_1 is significant but positive and is divergent.

Thus, all the equations in VECM are poorly fit because R^2 , F , are low and AIC and SC are inappropriate. So, VECM is nonstationary which is shown by Impulse Response Functions in Figure 4 but the VECM is stable since all roots lie inside or on the unit circle (in which there is one unit root) shown in Figure 3. Even, it suffers from autocorrelation problems which is shown by residual test for correlogram (Figure 5). Also the residuals of the VECM are not normally distributed as observed by Hansen-Doornik test (1994) and the values have been arranged in Table 3.

Figure 3: Unit circle



Source-Plotted by author

Figure 4: Impulse Response Functions

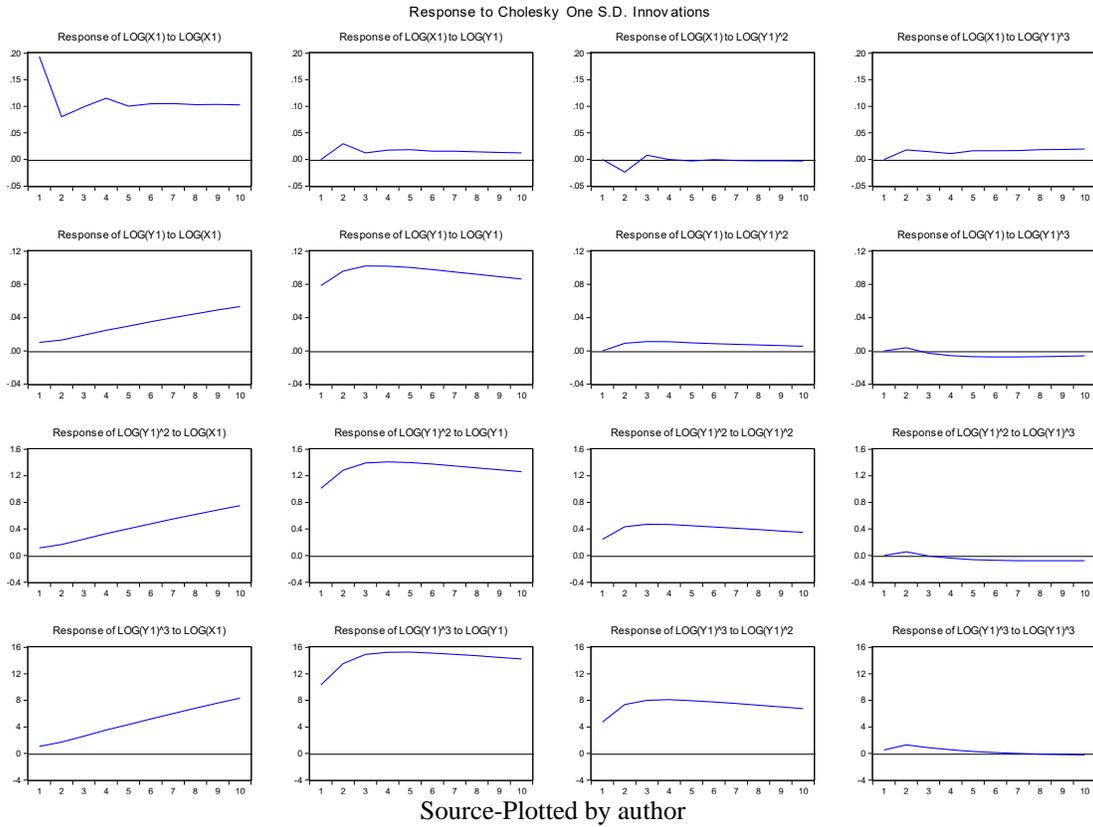


Figure 5: Problem of autocorrelation
 Autocorrelations with 2 Std.Err. Bounds

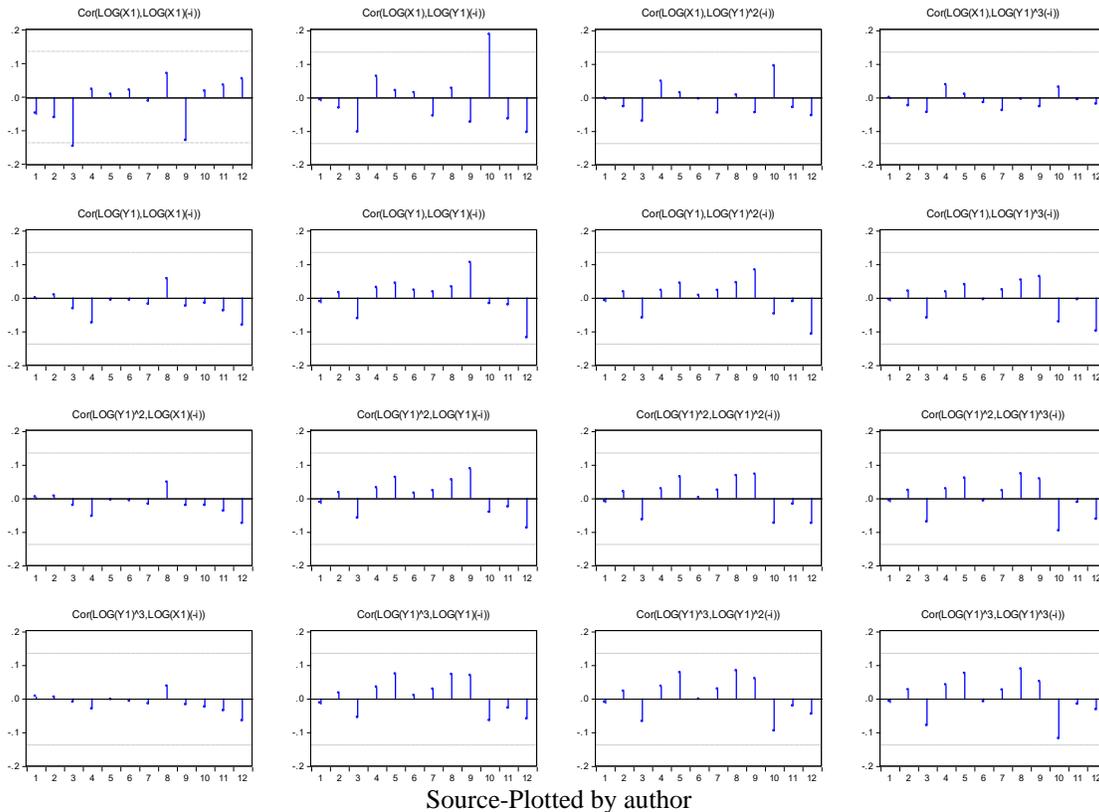


Table 3: Normality test (H0=residuals are multivariate normal)

Component	Skewness	Chi-square	df	Prob.
1	-6.832333	1680.508	1	0.0000
2	-0.435875	6.839525	1	0.0089
3	1.522227	83.41833	1	0.0000
4	-2.087027	156.8046	1	0.0000
Joint		1927.570	4	0.0000
Component	Kurtosis	Chi-square	df	Prob.
1	93.15778	73155.83	1	0.0000
2	6.438081	106.3836	1	0.0000
3	15.05436	1307.769	1	0.0000
4	16.68261	1684.924	1	0.0000
Joint		76254.90	4	0.0000
Component	Jarque-Bera	df	Prob.	
1	74836.33	2	0.0000	
2	113.2231	2	0.0000	
3	1391.187	2	0.0000	
4	1841.728	2	0.0000	
Joint	78182.47	8	0.0000	

Source-Calculated by author

[A]From the system equation of VECM-1, the observations of the short run and long run causality or associations among variables are as follows.

[i]Short run causality on $\log x_{1t}$ is shown in Table 4 which were found from Wald test.

Table 4: Short run causality

H0=no causality	Value of $\chi^2(2)$	prob	Reject/Accept	Causality(yes/no)
From $\log y_{1t-1}, \log y_{1t-2}$, to $\log x_{1t}$	2.86	0.23	Accept	no
From $\log y_{1t-1}^2, \log y_{1t-2}^2$ to $\log x_{1t}$	2.076	0.35	Accept	No
From $\log y_{1t-1}^3, \log y_{1t-2}^3$ to $\log x_{1t}$	1.77	0.41	Accept	No

Source-Calculated by author

Therefore, it is noted that there are no short run causalities running from $\log y_1, \log y_1^2, \log y_1^3$ to $\log x_{1t}$.

[ii] Long run causality

The estimated cointegrated equations from the system equation of VECM-1 are given below:

$$[1] EC_{1t-1} = -0.0179 \log x_{1t-1} - 0.004671 \log y_{1t-1}^3 + 0.00756t - 13.309$$

$$(0.79) \quad (-5.81)^* \quad (3.52)^*$$

$$[2] EC_{2t-1} = 0.7172 \log y_{1t-1} - 0.005435 \log y_{1t-1}^3 - 0.001197t - 4.6498$$

$$(2.11)^* \quad (22.14)^* \quad (-1.82)^*$$

$$[3] EC_{3t-1} = -0.0998 \log y_{1t-1}^2 - 0.081894 \log y_{1t-1}^3 - 0.010339t - 17.498$$

$$(-2.18)^* \quad (-42.28)^* \quad (-1.99)^*$$

Thus, [i] there is insignificant long run causality running from $\log y_{1t-1}^3$ to $\Delta \log x_{1t-1}$ [ii] there is no long run causality running from $\log y_{1t-1}^3$ and $\Delta \log y_{1t-1}$ to $\Delta \log x_{1t-1}$ [iii] there is significant long run causality running from $\log y_{1t-1}^3$ and $\log y_{1t-1}^2$ to $\Delta \log x_{1t}$. (visible in first figure in Figure 2 and the figures of the first row in Figure 4).

[B]From the system equation of VECM-2, the observations of the short run and long run causality are as follows.

[i]Short run causality on $\log y_{1t}$ is given below in Table 5 which was found from Wald test.

Table 5: Short run causality

H0=no causality	Value of $\chi^2(2)$	Reject/Accept	prob	Causality(yes/no)
From $\log x_{1t-1}, \log x_{1t-2}$ to $\log y_{1t}$	0.565	Accept	0.75	No

Source-Calculated by author

Therefore, there is no short run causality.

[ii] Long run causality

The estimated cointegrated equations from the system equation of VECM-2 are given below:

$$\begin{aligned}
 [1]EC_{1t-1} &= 0.01819 \log x_{1t-1} - 0.004671 \log y_{1t-1}^3 + 0.00756t - 13.309 \\
 &\quad (1.95)^* \quad (-5.81)^* \quad (3.52)^* \\
 [2]EC_{2t-1} &= -0.015433 \log y_{1t-1} - 0.005435 \log_{1t-1}^3 - 0.001197t - 4.6498 \\
 &\quad (-0.11) \quad (22.14)^* \quad (-1.82)^* \\
 [3]EC_{3t-1} &= -0.00153 \log y_{1t-1}^2 - 0.081894 \log y_{1t-1}^3 - 0.010339t - 17.498 \\
 &\quad (-0.08) \quad (-42.28)^* \quad (-1.99)^*
 \end{aligned}$$

Thus, [i] there is no long run causality running from $\log y_{1t-1}^3$ and $\log x_{1t-1}$ to $\Delta \log y_{1t}$ [ii] there is insignificant long run causality running from $\log y_{1t-1}^3$ and $\log y_{1t-1}$ to $\Delta \log y_{1t}$ [iii] there is insignificant long run causality running from $\log y_{1t-1}^3$ and $\log y_{1t-1}^2$ to $\Delta \log y_{1t}$
[C] From the system equation of VECM-3, the observations of the short run and long run causality are as follows.
[i] Short run causality on $\log y_{1t}^2$ is given below in Table 6 which were found from Wald test.

Table 6: Short run causality

H0=no causality	Value of $\chi^2(2)$	Reject/Accept	prob	Causality(yes/no)
From $\log x_{1t-1}, \log x_{1t-2}$ to $\log y_{1t}^2$	0.449	Accept	0.449	No

Source-Calculated by author

Therefore, there are short run causalities running from $\log x_{1t-1}, \log x_{1t-2}$ to $\log y_{1t}^2$.

[ii] Long run causality

The estimated cointegrated equations from the system equation of VECM-3 are given below:

$$\begin{aligned}
 [1]EC_{1t-1} &= 0.283578 \log x_{1t-1} - 0.004671 \log y_{1t-1}^3 + 0.00756t - 13.309 \\
 &\quad (2.31)^* \quad (-5.81)^* \quad (3.52)^* \\
 [2]EC_{2t-1} &= -0.556019 \log y_{1t-1} - 0.005435 \log_{1t-1}^3 - 0.001197t - 4.6498 \\
 &\quad (-0.30) \quad (22.14)^* \quad (-1.82)^* \\
 [3]EC_{3t-1} &= 0.077293 \log y_{1t-1}^2 - 0.081894 \log y_{1t-1}^3 - 0.010339t - 17.498 \\
 &\quad (0.31) \quad (-42.28)^* \quad (-1.99)^*
 \end{aligned}$$

Thus, [i] there are no long run causalities running from $\log y_{1t-1}^3$ and $\log x_{1t-1}$ to $\Delta \log y_{1t-1}^2$ [ii] there are insignificant long run causalities running from $\log y_{1t-1}^3$ and $\log y_{1t-1}$ to $\Delta \log y_{1t-1}^2$ [iii] there are no long run causalities running from $\log y_{1t-1}^3$ and $\log y_{1t-1}^2$ to $\Delta \log y_{1t-1}^2$
[D] From the system equation of VECM-4, the observations of the short run and long run causality are as follows.
[i] Short run causality on $\log y_{1t}^3$ is shown in Table 7 which were found from Wald test.

Table 7: Short run causality

H0=no causality	Value of $\chi^2(2)$	Reject/Accept	prob	Causality(yes/no)
From $\log x_{1t-1}, \log x_{1t-2}$ to $\log y_{1t}^3$	0.338	Accept	0.84	No

Source-Calculated by author

Therefore, there is no short run causality.

[ii] Long run causality

The estimated cointegrated equations from the system equation of VECM-4 are given below:

$$\begin{aligned}
 [1]EC_{1t-1} &= 3.412851 \log x_{1t-1} - 0.004671 \log y_{1t-1}^3 + 0.00756t - 13.309 \\
 &\quad (2.56)^* \quad (-5.81)^* \quad (3.52)^* \\
 [2]EC_{2t-1} &= -14.3236 \log y_{1t-1} - 0.005435 \log_{1t-1}^3 - 0.001197t - 4.6498 \\
 &\quad (-0.71) \quad (22.14)^* \quad (-1.82)^* \\
 [3]EC_{3t-1} &= 2.33729 \log y_{1t-1}^2 - 0.081894 \log y_{1t-1}^3 - 0.010339t - 17.498 \\
 &\quad (-2.18)^* \quad (-42.28)^* \quad (-1.99)^*
 \end{aligned}$$

Thus, [i] there are no long run causalities running from $\log y_{1t-1}^3$ and $\log x_{1t-1}$ to $\Delta \log y_{1t}^3$ [ii] there are insignificant long run causalities running from $\log y_{1t-1}^3$ and $\log y_{1t-1}$ to $\Delta \log y_{1t}^3$ [iii] there are no long run causalities running from $\log y_{1t-1}^3$ and $\log y_{1t-1}^2$ to $\Delta \log y_{1t}^3$

III. LIMITATIONS AND FUTURE SCOPE OF RESEARCH

Author has taken only four top emitter countries like USA, China, India and Japan for analysis of panel cointegration and VECM to relate CO₂ emission and GDP. This cross-section data can be extended in various fashions like, [i] adding more countries, [ii] adding countries with regional groupings, [iii] adding countries as poor and rich countries, [iv] adding countries as high, medium and low emitter countries. Author could include the relationship between per capita CO₂ emission and per capita GDP

to justify the validity of EKC hypothesis or curve. This relation can be analyzed in the group of countries in above fashions. All these researches are left for future research. [v] More-longer period of study can be taken for analysis.

IV. POLICY SUGGESTIONS

The first and foremost duties of the studied countries are to cut CO₂ emission for which some general policies should be adopted.

[i] Countries need environment free industries,[ii]Deforestation is strictly controlled,[iii]Kyoto protocol and Paris agreements and other vital climate negotiations should be implemented quickly(Bhowmik,2015),[iv]REDD and conservation of forest policies should be reformed, [v]Coordination and integration are needed among UNFCCC,IPCC,WMO,COP,WTO.,[vi] World Climate Fund must be revamped,[vii]US veto should be stopped,[viii] destruction of nuclear weapons and discourage of nuclear power could be encouraged,[ix] Consumption and production patterns of energy must be changed,[x]Alternative energy sources should be encouraged,[xi]Education and public awareness programme should be needed for good understanding of green earth,[xii] Use of other GHG like CH₄,CO,SO₂ etc should be less,[xiii] Ecological balance is the prime importance of climate policy ,[xiv] An international institution is needed where all emitter members should have compulsion to implement climate policy negotiations which had taken from the UNFCCC(Bhowmik,2012),[xv] It is urgent to constitute common rules for carbon trading in UNFCCC.

V. VIII. CONCLUSIONS

The paper concludes that one per cent increase in GDP of USA, China, India and Japan led to 0.445 per cent increase in CO₂ emission per year significantly during 1960-2016 in the random effect model of panel regression. In the decoupling model under panel regression during the same period it was found that the elasticities of CO₂ emission with respect to GDP, GDP², GDP³ and GDP⁴ were -8.94, 2.45, -0.262 and 0.0098 respectively all of which are significant at 5% level under fixed effect model of panel regression. It indicates that EKC is inverted N shaped. Panel cointegration among log value of CO₂ emission and log values of GDP, GDP², GDP³ and GDP⁴ showed three cointegrating equations where VECM is stable, nonstationary, non-normal and having serial correlation problems. There is no short run causality running from GDP, GDP², GDP³ respectively on CO₂ emission but there is long run causality running from GDP and GDP³ on CO₂ emission in which one of three error correction is converging significantly towards equilibrium with the speed of adjustment at the rate of 9.98% per annum.

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Antimicrobial Study on *Alstonia Boonei*, *Phyllanthus Amarus* and *Nuclea Latifolia*, Three Ethnomedicinal Plants of Nigeria

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Abstract- *Phyllanthus amarus*, *Alstonia boonei*, *Nauclea latifolia* are plants which are present abundantly in Nigeria and other tropical countries. The success of chemotherapy against the challenge posed by the dynamic emergence of resistant strains lies in the continuous search for new potent drugs. Plant-derived antimicrobials have a long history of providing the much needed novel therapeutics and lead compounds. This study investigated the antimicrobial activity of methanol and n-hexane extracts of the leaves of three ethnomedicinal plants; *Alstonia boonei*, *Phyllanthus amarus*, and *Nauclea latifolia* against a panel of clinical significant microorganisms viz *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Candida albicum* and *Candida tropicalis*. The methanol and n-hexane extracts of the plants were subjected to microbial susceptibility assay using agar well diffusion method and The Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) were determined using micro dilution assay. Methanol crude extracts of *Alstonia boonei* and *Phyllanthus amarus* showed a good antimicrobial activity with MIC and MBC values ranging from 1.5mg/mL to 2.5 mg mL⁻¹. The MBC/MIC values of these extracts range from 1 to 1.67 they are thus bactericidal.

Index Terms- antimicrobial activity; ethnomedicinal plants; methanol extract; n-hexane extract, antibiotics

I. INTRODUCTION

Many cultures throughout the world still rely on indigenous medicinal plants for their primary health care needs. Farnsworth N, Akerele AO, Bingel AS, Soejarto DD, Guo Z, (1985). However, scientific proof that the active components contained in these medicinal plants are useful, safe, and effective is generally lacking and remain the main problem facing the use of herbal traditional medicines. This proof is necessary in order to eliminate the concern of their use as drugs for alternative treatment. (John Prosper Kwaku Adotey, Genevieve Etonam Adukpo, Yaw Opoku Boahen, and Frederick Ato Armah, 2012). To date, 25% of modern medicines are derived from plants that have been used by traditional medical practitioners. Cragg G. and Newman DJ, (2005)..The success of chemotherapy against the challenge posed by the dynamic emergence of resistant strains lies

in the continuous search for new potent drugs. Mohamed Sham Shihabudeen. H ,Hansi Priscilla. D, Kavitha Thirumurugan, (2010).

Plant-derived antimicrobials have a long history of providing the much needed novel therapeutics. Silva MSP, Brandao DO, Chaves TP, Filho ALNF, Costa EMDB, Santos VL. (2012). There is therefore the need for screening of ethnomedicinal plants in order to validate their ethnomedicinal uses and to isolate and characterise their bioactive(s) towards the development of ethnopharmacopea, the discovery of novel active compounds and drug development. In this study methanol and n-hexane extracts of three plants (*Alstonia boonei*, *Phyllanthus amarus*, *Nuclea Latifolia*), indigenous to Nigeria and with reported medicinal uses were screened for their antimicrobial activity.

II. MATERIALS AND METHOD

Fresh samples of leaves of three ethnomedicinal plants, namely; *Alstonia boonei* obtained from Ago owu farm settlement, Ayedaade L.G.A. Osun state, *Phyllanthus amarus*, from Liverpool farm settlement, Apapa L.G.A. Lagos state, and *Nuclea latifolia* from Ogogo Oke farm in Boripe L.G.A. Osun state were screened. All samples were authenticated at the botany department Obafemi Awolowo University, Ile Ife, Nigeria.

Extract Preparation

The Air-dried and pulverised plant samples were cold extracted 7 days with methanol and hexane. The extract was filtered and allowed to evaporate in open air. The dried extract is dissolved in 10% DMSO and stored in refrigerator until used.

Test Microorganisms

The test organisms were collected from a stock culture maintained at 4°C in the Department of Microbiology, University of Ilorin, Kwara state, Nigeria. One gram-positive bacteria: *Staphylococcus aureus*, three gram-negative bacteria: *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* and two fungi: *Candida albicans* and *Candida tropicalis* were used in the study.

Preparation of inoculum

The strains were maintained on nutrient broth. Active cultures for experiments were prepared by transferring a loopful of each organism into 50ml of the broth in 100ml conical flasks. The Mueller-Hinton broth (MHB) for bacteria and Sabouraud dextrose broth (SDB) for fungi were incubated without agitation for 24 h at 37°C and 48h at 25°C respectively.

Antimicrobial Assay

Agar well diffusion method:

200µl of bacteria and fungi were aseptically introduced and spread using cotton swab, on the surface gelled sterile Muller Hinton agar (MHA) plates and Sabouraud dextrose agar (SDA) plates respectively. A well of 6.0mm diameter with sterile cork borer was aseptically punched on each agar plate and 50 µl of each plant methanol and n-hexane extracts were introduced into the well.

In vitro antimicrobial activity was screened by using Mueller Hinton Agar (MHA). Negative control was prepared using 50ml of the respective solvent and positive control was made by placing several antibiotics disc on agar plates and then incubated at 37°C for 24h for the bacteria and 48h for the fungi. At the end of incubation, inhibition zones formed around the disc were measured with transparent ruler in millimeter.

Minimum Bactericidal Concentrations (MBC) were determined using 150mg/ml and 250mg/ml of the extracts and standardized bacterial and fungi cultures (1 x 10⁶ cfu/ml)

III. RESULTS

Table 1: Zones of inhibition (mm) of the plants extracts on selected clinical microorganisms.

Methanol extracts						
Clinical isolates	<i>S.aureus</i>	<i>E.coli</i>	<i>P.aeruginosa</i>	<i>K.pneumoniae</i>	<i>C.albicans</i>	<i>C.tropicalis</i>
<i>A.boonei</i>	-	19	18	14	14	15
<i>P.amarus</i>	16	16	-	18	-	-
<i>N.latifolia</i>	-	14	-	-	-	-
n-hexane extracts						
<i>A.boonei</i>	20	14	-	16	17	-
<i>P.amarus</i>	12	15	14	-	-	-
<i>N.latifolia</i>	-	-	-	-	-	-

Key:

-: No zone of inhibition

Table 2: Antimicrobial activity of varying concentrations (mg/ml) of the plants extracts on selected clinical microorganisms.

Methanol extracts						
Clinical isolates	<i>S.aureus</i>	<i>E.coli</i>	<i>P.aeruginosa</i>	<i>K.pneumoniae</i>	<i>C.albicans</i>	<i>C.tropicalis</i>
<i>A.boonei</i>						
150	NA	-	-	-	-	-
250	NA	-	-	-	-	-
<i>P.amarus</i>						
150	12	-	NA	-	NA	NA
250	-	-	NA	-	NA	NA
<i>N.latifolia</i>						
150	NA	-	NA	NA	NA	NA
250	NA	+	NA	NA	NA	NA
n-hexane extracts						
<i>A.boonei</i>						
150	-	14	NA	-	-	NA
250	-	-	NA	-	-	NA
<i>P.amarus</i>						
150	+	+	+	NA	NA	NA
250	-	+	+	NA	NA	NA
<i>N.latifolia</i>						
150	NA	NA	NA	NA	NA	NA
250	NA	NA	NA	NA	NA	NA

Key:

-: Clear (No Microbial growth)

+: Turbid (Microbial growth)

NA: Not applicable

Table 3: Minimum Inhibitory Concentration and Minimum Bactericidal Concentration (mg/mL) of the plants extracts on selected clinical microorganisms.

Methanol extracts						
Clinical isolates	<i>S.aureus</i>	<i>E.coli</i>	<i>P.aeruginosa</i>	<i>K.pneumoniae</i>	<i>C.albicans</i>	<i>C.tropicalis</i>
<i>A.boonei</i>						
MIC	NA	1.5	1.5	1.5	1.5	1.5
MBC	NA	1.5	1.5	1.5	2.5	1.5
MBC/MIC	-	1	1	1	1.67	1
<i>P.amarus</i>						
MIC	2.5	1.5	NA	1.5	NA	NA
MBC	2.5	2.5	NA	1.5	NA	NA
MBC/MIC	1	1.67	-	1	-	-
<i>N.latifolia</i>						
MIC	NA	2.5	NA	NA	NA	NA
MBC	NA	-	NA	NA	NA	NA
MBC/MIC	-	-	-	-	-	-
n-hexane extracts						
<i>A.boonei</i>						
MIC	1.5	2.5	NA	1.5	1.5	NA
MBC	1.5	2.5	NA	1.5	1.5	NA
MBC/MIC	1	1	-	1	1	-
<i>P.amarus</i>						
MIC	+	+	+	NA	NA	NA
MBC	-	-	-	-	-	-
MBC/MIC	-	-	-	-	-	-
<i>N.latifolia</i>						
MIC	NA	NA	NA	NA	NA	NA
MBC	NA	NA	NA	NA	NA	NA
MBC/MIC	-	-	-	-	-	-

Key:

- : Clear (No Microbial growth)

+: Turbid (Microbial growth)

NA: Not Applicable

Table 4 Susceptibility test (zone of inhibition [mm]) using standard antibiotics discs against selected clinical microorganisms.

Clinical isolates	<i>S.aureus</i>	<i>E.coli</i>	<i>P.aeruginosa</i>	<i>K.pneumoniae</i>	<i>C.albicans</i>	<i>C.tropicalis</i>
AUG	-	-	-	-	-	-
GEN	16.5	-	-	13	-	-
OFL	20	-	-	-	12	-
ERY	-	NA	NA	NA	NA	NA
CRX	-	-	-	-	14	12
CAZ	9	-	-	-	-	-
NIT	-	12	-	10.5	19	10
CTR	-	NA	NA	NA	NA	NA
CXC	-	NA	NA	NA	NA	NA
AMP	12	-	-	-	-	-
CPR	-	-	-	-	-	-

Key:

- : Resistance,

NA: Not Applicable,

AUG: Amoxicillin./Clavulatrare, GEN: Gentamycin, OFL: Ofloxacin; ERY: Erythromycin, CRX: Cefuroxime, CAZ: Ceftazidime, NIT: Nitrofuratoin, CTR: Ceftraxone, CXC: Cloxicillin, AMP: Ampicilin. CPR: Ciprofloxacin,

IV. DISCUSSION

Table 1 show the zone of inhibition of the methanol and n-hexane extracts of *A. boonei*, *P. Amarus* and *N.latifolia* on selected clinical microorganisms. Methanol and n-hexane are common solvents used for solvent extraction of plants because they liberate greater amounts of bioactive compounds (Sasidharan *et. al.*, 2011, *Yadau and Agarivala*, 2011).

Zone of inhibition of methanol extracts of *A. boonei* at 19mm on *E. Coli* was highest, followed by *P.Aeriginosa* at 18mm and this has a correlation with *P. amarus* *K. pneumoniae* at 18mm. *N.latifolia* was not sensitive on most of the clinical microorganisms except on *E.coli* at 14mm. n-hexane extracts of *A.boonei* show sensitivity to most of the clinical microorganisms except for *P.aeriginosa* and *C.tropicalis* with *S.aureus* at 20mm, *E.coli* at 14mm, *K.pneumoniae* at 16mm, *C.albicans* at 17mm. same for the extract of *P.amarus* with *S.aureus* at 12mm, *E.coli* at 15mm, *P.aeriginosa* at 14mm. all the selected microorganisms show resistance to n-hexane extract of *N. latifolia*. All the extract showed no inhibition of *C. tropicalis*.

Table 2 show the antimicrobial activity of varying concentrations of the plant extracts on the selected clinical microorganism. All the extracts do not show sensitivity at the concentrations used (150mg/ml and 250mg/ml) except for the 150mg/ml methanol extract of *P.amarus* at 12mm and 150mg/ml n-hexane extract of *A.boonei* at 12mm. There were no microbial growth and where there were, they were turbid.

Table 3 show the minimum inhibitory concentration (MIC) and minimum bactericidal concentration of the methanol and n-hexane extracts on the selected clininical microorganisms. The MIC and MBC on methanol extracts of both *A.boonei* and *P.amarus* have identical concentrations. For example *E.Coli*, *P.aeriginosa*, *K.pneumonia* and *C.tropicalis* have the same MIC and MBC values, except in *C.albicans* where it show 1.5 mg/mL and 2.5 mg/mL respectively on the extract of *A.boonei*. MIC and MBC of n-hexane extracts are same for *A.boonei* and *P.amarus* on the microorganisms used. *N. latifolia* show no sensitivity on the microorganisms. This consistent with the results from Table 1 and Table 2.

Table 4 show susceptibility test using standard antibiotics discs against the selected clinical microorganisms. Susceptibility was noticed on the antibiotics GEN: Gentamycin, OFL: Ofloxacin, CAZ: Ceftazidime, and AMP: Ampicilin for *S.aureus*, NIT: Nitrofuratoin, for *E.coli*. GEN: Gentamycin and NIT: Nitrofuratoin for *K. pneumoniae*, OFL: Ofloxacin, CRX: Cefuroxime and NIT: Nitrofuratoin for *C.albicans* and CRX: Cefuroxime and NIT: Nitrofuratoin for *C. topicalis* From the above results GEN: Gentamycin, OFL: Ofloxacin, CRX: Cefuroxime and NIT: Nitrofuratoin are the most potent antibiotics while AMP: Ampicilin and CAZ: Ceftazidime are slightly sensitive. GEN, OFL and NIT are broad spectrum antibiotics having effect on both gram positive and gram negative bacteria, and compatible activity with *A. boonei* and *P.amarus* as shown in

Table 1 with whose zones of inhibition met the standard antibiotics used, especially GEN and OFL antibiotics.

V. CONCLUSION

A good antimicrobial activity of methanol and n-hexane leaf extracts of *A. boonei* and *P.amarus* was observed when compared to standard antimicrobial agents. This study therefore supports the use of *A. boonei* and *P.amarus* as medicinal plant by traditional healers. Further work is needful to fractionate, isolate and characterize their specific bioactive constiyuent(s) responsible for the antimicrobial activity and reported medicinal properties towards development of our ethnopharmacopea and drug development.

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Physicochemical Comparison of Ikogosi Spring and Bottled Water

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Abstract- Water is very important for life, it is a useful resource for domestic, industrial and agricultural purposes. Water samples were taken for analysis from Ikogosi warm spring. Cold water (S1), warm water (S2), mixture of warm and cold water (S3) at a definite distance, distilled water (S4) and Gossy water (S5) samples were obtained. All the water samples were tasteless and odorless and they are clear in appearance. Sample 1, 2, 3 and 4 had the temperatures of 37°C, 26°C, 30°C, 25°C respectively. S1 value was highest in temperature due to the direct flow of water from the rock, but for the sample 5, Gossy bottled water was already refined to the ambient temperature of 25°C. The concentrations of alkalinity, total hardness, sulphate (SO₄²⁻), nitrate (NO₃⁻), chloride (Cl⁻) were all below WHO guidelines value. The turbidity of all the samples is within the tolerable range set by WHO. The results of some of these parameters are however below the quality standard specification for ground water meant to be used for consumption.

I. INTRODUCTION

Water is very important for life; we need water to drink, to wash our hands, to cook, to water plants and many other things. Water is a useful resource for domestic, industrial and agricultural purposes and it's important to man cannot be overemphasized due to its essentiality in body metabolism and proper functioning of cells (Mihayo and Mkoma, 2012). All plants and animals must have water to survive, if there was no water there would be no life on earth. Apart from drinking to survive, people have many other uses for water. These include Cooking, washing their bodies, washing clothes, washing cooking and eating utensils; such as billies, sauce pans, crockery and cutlery, keeping houses and communities clean, recreation; such as swimming pools, keeping plants alive in gardens and parks (Mariette, 2018).

Ikogosi Warm Spring is about 55 km from Akure, the Ondo State capital, Nigeria. Ikogosi is located in Ekiti West L.G.A. The warm spring roll down over at hilly landscape at seventy degrees, from another hill rises a cold spring which joins the warm spring at a confluence at the end maintaining a temperature of 37°C. Together they form a continuous stream. The whole landscape with its green vegetables is fascinating. The immediate surroundings of the spring (resort centre) is about 31.38 hectares and is protected from erosion by tall evergreen trees, forming a canopy under which tourists can relax.

The aim of this research is to assess the suitability of Ikogosi's portable water, spring's cold water and warm water for human consumption by estimating its physicochemical parameter in comparison with prescribed standards.

II. MATERIALS AND METHODS

SAMPLE COLLECTION AND PREPARATION

Water samples were collected from Ikogosi warm spring at the outlets points. Cold water sample (S1) was obtained at the cold spring source, warm water sample (S2) was obtained from water source. The mixture (S3) was obtained at confluence point which has a warm temperature. A distilled water sample (S4) was obtained from the organization as well as the bottled Gossy water (S5). All the samples were conditioned and placed in sample bottles. The samples were later transferred to the Osun State Polytechnic's Analytical Laboratory where analyses were carried out. All analyses were carried out according to the methods described by Association of Analytical Chemist (AOAC, 2010). The determinations were carried out in triplicate.

III. DISCUSSIONS

Table below represents the physicochemical parameters of water samples obtained from Ikogosi water Spring. The samples include cold water from source (S1), Warm water from source (S2), mixture of the warm and cold (S3), distilled water sample (S4), and bottled Gossy water (S5). Parameters like pH, temperature and conductivity were determined at sample points whereas other parameters were determined in the laboratory.

pH value of warm and cold spring complies with the pH standard of World Health Organization (WHO) they fall in the range of 5.9 and 6.8 and the pH of warm and cold spring water mixture also comply to the standard of W.H.O. same with Gossy table water's pH (6.8). We know that every pH of water is 7.0, if it is greater than 7 is an alkaline, therefore, the pH of distilled water is exactly 7.0 due to change and forms which pH test was carried out on it. So, the distilled water also conforms to the W.H.O standard which is the exact value for pH in water. This pH has a mean of ± 6.24 and standard deviation of ± 0.62 and coefficient of variance of 9.75% that makes the water okay. pH value is the logarithm of reciprocal of hydrogen ion activity in moles per litre.

Conductivity indicates the presence of ions within the water usually due to elemental composition in the sample majorly caused by leaching. It can also indicate industrial discharges. Therefore, the W.H.O standard for conductivity in water is 1200 μ S/cm. The samples comply to the standard of W.H.O which are 93.0, 46.0 and 87.0 for the warm and cold spring water and mixture respectively. Gossy bottled water falls between the standard of W.H.O. the only sample with the highest conductivity is the distilled water with 169 μ S/cm. This is an indication that the purer the water the freer the ability to conduct. The mean of the measurement is 83.8 and Standard Deviation is 51.3. The assessment of these waters samples complies with W.H.O standard.

Temperature can exert great control over aquatic communities if the overall water body temperature of a system is altered, an aquatic community shift can be expected. Temperature was measured here in degree Celsius ($^{\circ}$ C); The maximum point indicated by W.H.O is 37 $^{\circ}$ C. The warm spring water sample (S1) of Ikogosi do not exceed this point at the time the sample was taken. It is also a point to note that the sample looks clearer compared to other samples which could be due to the influence of the heat energy on it. the cold water sample (S2) has a temperature of 26.0 $^{\circ}$ C. the mixture at confluence (S3) has a temperature of 29.8 $^{\circ}$ C, the distilled water sample has 26.0 $^{\circ}$ C and also Gossy bottled water has temperature of 25.0 $^{\circ}$ C. the samples didn't exceed the maximum temperature recommendation of W.H.O. The mean of the result is 28.8 and Standard Deviation is 4.95.

Turbidity may be due to organic or inorganic constituents. Organic particulates may harbor microorganisms. Thus, the turbidity conditions may increase the possibility for water borne disease; therefore, the maximum standard for turbidity recommended by W.H.O is 5.0NTU. all the samples has turbidity below the maximum recommendation point. The warm spring sample (S1) has a value of 0.61 NTU, cold spring sample (S2) has 3.85NTU, mixtures of cold and warm spring sample (S3) has 0.62 NTU and the distilled water sample (S4) has 0.37NTU. the Gossy sample(S5) has no observable turbidity value, that is 0.00NTU. The samples values ranges from 0.00-3.85 NTU and the mean is 1.09 and Standard Deviation of 1.56. The only water that does not have impurities is the Gossy bottled water which have been treated and free from microorganisms and turbidity; the cold spring is more turbid than the warm spring.

Total dissolved solid in mg/L of warm spring (S1) is 62.3 and that of cold spring (S2) is 30.8, the mixture (S3) is 58.3, the distilled sample (S4) is 113 whereas the Gossy water sample (S5) is 16.1. All the samples fall below the maximum value for dissolved solid of 1500mg/l. the distilled water sample presented an unexpected value but this could be due to processes the water was made to pass through. Dissolved solid is a measure of the dissolved combined content of all inorganic and organic substances present in the solution in molecular, ionized or micro granular suspended forms.

Alkalinity of water is generally due to the presence of carbonate and hydroxide ions. The alkalinity ranges of the samples are from 3.00-8.00mg/L. The average value with standard deviation is 5.40 \pm 1.81. All the samples fall below the maximum value of 100mg/L which makes them to conform with W.H.O standard. The alkalinity of warm sample source S1 is 5.00 while that of cold water source S2 is 3.00, the mixture (S3) is 6.00, the

distilled water sample is 5.00 whereas the Gossy water sample has 8.00.all the samples comply with the standard stipulated by W.H.O.

Nitrate NO₃⁻ is the end product of decomposition of organic matter and indicates the organic matter present in water is fully oxidized and it is not harmful anymore. From the table above, the nitrate ranges from 1.08-2.40mg/L with a mean value and standard deviation of 1.64 \pm 0.51. All the samples fall below the maximum value of 50mg/L stipulated by W.H.O. The nitrate value of S1 (warm spring) is 1.50mg/L, cold spring (S2) is 1.34mg/L, the mixture (S3) is 2.40mg/L, the distilled sample (S4) is 1.89mg/L whereas the Gossy water sample (S5) is 1.08.

Iron Fe²⁺ in water may be present in dissolved, colloidal or suspended form. Generally, the ferric form is predominant in natural water. The values of Iron in the samples are below the maximum permissible level as indicated by W.H.O. standard. The values of iron in the samples ranges from 0.02 – 0.05mg/L with the mean and standard deviation of 0.03 \pm 0.012. The value for S1 (warm spring water) is 0.03, S2(cold spring water) is 0.02, S3 (mixture) is 0.03, S4 (distilled water sample) is 0.02 whereas S5 (the Gossy water sample) is 0.05. For sample S5, the ion exchange resin purifier could be responsible for slight increase observed.

Calcium (Ca²⁺) occurs in water mainly due to the presence of limestone, gypsum, dolomite and gypsiferous materials. The ranges of calcium content of the water samples ranges from 6.41 - 22.2mg/L. the maximum permissible level has not been determined by W.H.O. standard. This is an indication that calcium content negative effect on consumer's health has not been determined. Cold water sample S1 has a value of 8.02mg/L, warm water sample S2, has a value of 9.62mg/L, mixture S3 has a value of 10.4mg/L, the distilled water sample S4, has a value of 6.41mg/L whereas Gossy water sample S5 has a value of 22.4mg/L. Iron exchange treatment of processed water could be responsible this high value obtained.

Magnesium (Mg²⁺) salts occur in natural waters, sea waters. The range of Magnesium content in the samples ranges from 3.42- 8.78mg/L. Cold water sample S1 has a value of 8.78mg/L, warm water sample S2 has a value of 5.86mg/L, the mixture sample S3 ha a value of 5,86mg/L, the distilled water sample S4 has a value of 3.42mg/L whereas the Gossy water sample S5 has a value of 8.30. As stated above, ion exchange process could be responsible for the observed value.

IV. CONCLUSIONS

From the results obtained in this research, all the water samples contain physicochemical parameters which are below the maximum permissible limit for drinking water. S1 , the warm water sample was highest in term of total water hardness beside the Gossy water sample which could have been made hard through ion exchange process. Gossy water sample also exhibited higher elemental content , the reason is also suggested to be as a result of the processes the water was made to pass through. The nitrate, turbidity, alkalinity, total dissolved solid, pH and conductivity values are below the maximum values for portable water. The temperature value of warm water sample is not beyond the maximum value for water body so as to be able to support living organism. Microbiological assessment of these water samples could give vivid insight to their portability.

Table 1: Physicochemical Parameters of Water Samples from Ikogosi Spring Water

Parameters	Units	MP: WHO Standard	S1	S2	S3	S4	S5	Range
pH at 20°C	°C	6.50-9.50	5.9	6.8	5.6	7.0	6.8	5.6-7.0
Conductivity	µs/cm	1200µs/cm	93.0	46.0	87.0	169	24.0	24.0-169
Temperature	°C	37°C	37.0	26.0	29.8	26.0	25.0	25.0-37.0
Total Dissolved Solid	mg/L	1500mg/L	62.3	30.8	58.3	113	16.1	16.1-113
Turbidity	NTU	5.0NTU	0.61	3.85	0.62	0.37	0.00	0.00-3.85
Chloride (Cl⁻)	Mg/L	250mg/L	6.99	7.99	18.0	9.99	11.0	6.99-18.0
Fluoride	Mg/L	1.5mg/L	0.34	0.25	0.37	0.28	0.24	0.24-0.37
Sulphate(SO₄²⁻)	Mg/L	500mg/L	3.00	4.00	1.00	2.00	2.00	1.00-4.00
Alkalinity	Mg/L	100mg/L	5.00	3.00	6.00	5.00	8.00	3.00-8.00
Nitrate NO₃²⁻	Mg/L	50mg/L	1.50	1.34	2.40	1.89	1.08	1.08-2.40
Calcium hardness CaCO₃	Mg/L	200mg/L	20.0	24.0	26.0	16.0	56.0	16.0-56.0
Total hardness	Mg/L	500mg/L	56.0	48.0	50.0	30.0	90.0	30.0-90.0
Magnesium hardness CaCO₃	Mg/L	20mg/L	36.0	24.0	24.0	14.0	34.0	14.0-36.0
Iron (Fe²⁺)	Mg/L	3mg/L	0.03	0.02	0.03	0.02	0.05	0.02-0.05
Manganese(Mn)	Mg/L	0.4mg/L	0.01	0.01	0.01	0.02	0.01	0.01-0.02
Calcium(Ca²⁺)	Mg/L	ND	8.02	9.62	10.4	6.41	22.4	6.41-22.4
Magnesium(Mg²⁺)	Mg/L	20mg/L	8.78	5.86	5.86	3.42	8.30	3.42-8.78
Copper(Cu²⁺)	Mg/L	2.0mg/L	0.05	0.04	0.05	0.04	0.05	0.04-0.05
Chromium(Cr⁶⁺)	Mg/L	0.05mg/L	0.03	0.02	0.03	0.03	0.04	0.02-0.04
Sodium(Na)	Mg/L	200mg/L	4.54	5.19	12.0	6.49	7.14	4.54-12.0

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A study of current Continuous Medical Education / Continuous Professional Development programmes for health care staff with special focus on Medical officers and recommendation for improvement

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Abstract- Continuing Medical Education (CME) is an educational activity which helps to maintain, develop, or increase the knowledge, skills, professional performance and relationships that help physician to provide services for patients, whereas Continuous Professional Development (CPD) refers to the education following completion of formal training, which will help to maintain, develop or increase knowledge, technical skills and standards, resulting in better healthcare. Therefore CME and CPD go hand in hand. This qualitative study was performed with Key Informant interviews and focus group discussions to study of current Continuous Medical Education / Continuous Professional Development programmes for health care staff with special focus on Medical officers and recommendation for improvement. Main findings were, there was no firm CPD frame work in the health sector, but some CPD programmes were performed in various professional colleges. It was also found that, there was no proper training need analysis and performing CME / CPD programmes based on the training need analysis. With the view of improving the professional development it was recommended to perform training need analysis, prepare CPD programmes based on the training needs and to establish national level CPD framework.

Index Terms- Continuous Medical Education / Continuous Medical Development, Health Sector, Doctors

I. INTRODUCTION

Continuing Medical Education (CME) is an educational activity which helps to maintain, develop, or increase the knowledge, skills, professional performance and relationships that help physician to provide services for patients [1].

CME allows health care providers to [2]:

- Improve skills for patient care
- Stay updated with latest developments within their speciality
- Help health care professionals face day to day real-world challenges
- Help for professional growth leading towards advance career status
- Meet licensing / certification requirements

- Learn effective medical team management skills
- Earn membership in professional organizations

Continuous Professional Development (CPD) refers to the education following completion of formal training, which will help to maintain, develop or increase knowledge, technical skills and standards, resulting in better healthcare. CPD is broad which include not only acquiring new knowledge or skills as a doctor but also encompass one's personal development [3]. Studies have demonstrated that there is no designated method of CPD [4].

CME concentrates on professionals keeping them up to date and improving specialist knowledge by education and training in areas determined by experts. Professionals play a vital role in CPD to define the knowledge which they see as relevant to their own professional needs. Learning takes place not only at individual level, but also at the organizational level [5]. The amount of biomedical knowledge available doubles every 20 years [6]. A doctor's practice could become rapidly outdated. Because patients needs, doctors practice keep changing with time, knowledge should be up to date to engage in good medical care [7].

CPD is helpful to maintain, develop or increase knowledge, technical skills, problem solving and professional performing standards with the aim of providing better healthcare services [8]. Learning via CPD is seen as essential for effective practice and for individual professional development, whether or not it results in career progression [4].

A comparative analysis done by Garattini L et.al 2010 [9] showed CME is formally compulsory in Austria, France, Italy and UK. Belgium and Norway are the two countries that offer financial incentives to enhance CME participation. Formal accreditation is required by the providers of CME activities in Austria, France and Italy, while in the other three countries accreditation is focused on activities. Private sponsorship is allowed in all countries but Norway, within certain limits [9].

The College of General Practitioners Sri Lanka (CGPSL) has conducted programmes for CME and CPD for general / family practitioners during the past three decades. The main CME/CPD activity of the College has been the annual academic session which is a valuable forum for education and presentation of research

work [10]. CME / CPD programmes mainly conducted by Sri Lanka Medical Association (SLMA) and other colleges.

II. METHODOLOGY

Objective of the study was to identify, current Continuous Medical Education programmes for Medical officers and recommendation for improvement. Study was done in Sri Lanka in relation to public health sector. Methods used in the study were Key Informant Interviews, Focus Group Discussions, literature review, reviewing secondary data. Key Informant Interviews done with the key officials in the health sector and Focus Group Discussions with the medical officers.

III. RESULTS

There were no CPD framework in Sri Lanka and the Continuous Medical Education & Continuous Professional Development programmes were not regularly conducted and streamlined with limited coverage without covering the entire country. Majority of the professional colleges were not uniformly involved in the CME & CPD programmes. It was observed that poor participation of Medical Professionals for CME and CPD activities. There were no mandatory requirements participating in the CME & CPD programmes in the current system. Many colleges performed CME / CPD programmes individually linking with their annual academic sessions. But these programmes were focused for their specialty. When it comes to areas in CME & CPD some areas in the medical profession are not much covered, whereas certain areas are well covered from CME & CPD programmes (e.g. Cardio Respiratory Resuscitation programmes). There was no training need analysis or national training programme for each category of staff in the health sector depending on the training need analysis. It was also found that there were no accreditations or evaluations processes for these CPD programmes carried out.

IV. DISCUSSION

Continuous Medical Education / Continuous Professional Development, is important to medical professional to keep their knowledge and skills up to date in this changing world and also it observed that, currently there are many transitions taking place in the country, namely demographic, technological, economical transitions etc. Since there is no mandatory requirement for CME / CPD programmes, it is essential to mandate these programmes with the view of improving their knowledge and skills in their professional carrier. These CME / CPD programmes should give opportunity to earn CPD points. These CPD points should link with for various evaluation e.g. transfers, promotions scholarships etc. Country should have a National CPD frame work in each sector, especially in the health sector.

V. CONCLUSION

CPD programmes are lacking in the Health system in Sri Lanka, but there are few CPD programmes carried out by

professional colleges and Sri Lanka Medical Association. Although these programmes are conducted, it is not done in an organized manner. There have been many attempts to develop CPD frame work in Sri Lanka but the effort was not successful. In this study there were gaps found in CPD and CME programmes in Sri Lankan health system. Based on this study it can be recommended following recommendations to a country to streamline CPD / CME programmes for professional development and ultimately aiming the improvement of health system.

VI. RECOMMENDATIONS

1. Establish a national level CPD frame work for a country.
2. Conduct a national Training needs analysis for each category.
3. Establish a national CPD programmes for each category of staffs in the health sector depending on training need analysis.
4. Establish a human resource database and incorporate CPD programmes points gained by individuals to this human resource database for future usage.
5. A policy decision in mandating CME / CPD programmes in professionals carrier.
6. Usage of CPD points for evaluation (annual increment, transfers etc.) and awarding rewards for professionals (promotions, scholarships etc.).

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Business Teachers And Students' Perception Towards Assessment Practices

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Abstract- This study investigated Business teachers and students' perception towards the practice of assessment in Mfantseman Municipality, Cape Coast. To realize their perceptions, descriptive survey design was used. A close-ended questionnaire item with five point Likert- scale was administered to forty teachers and two hundred and thirty students. The data was analysed using descriptive statistics. The results from the data indicated that the students and teachers had a positive perception about assessment. The findings also indicated that there was no statistically significant difference between teachers and students' perception towards the practice of assessment. Most of the teachers in this study used assessment for documenting learning, rather than reporting purposes. The findings of the study revealed that most teachers and students prefer multiple-choice, true-false, essay and matching type questions than assessment that focused on practical aspects. It was concluded that, teachers and students had positive perception towards assessment in Business Studies. The study recommended that professional development programs for Business Studies teachers should stress the use of wide range of assessment practices.

Index Terms- Business Studies, Perception and Assessment Practices.

I. INTRODUCTION

Education is a very important human activity. It helps any society to fashion and model individuals to function well in their environment. According to Boit, Njoki and Chang'ach (2012), the purpose of education is to equip the citizenry to reshape their society and eliminate inequality. Provision of quality secondary education is therefore important in generating the opportunities and benefits of social and economic development (Onsumu, Muthaka, Ngware & Kosembei, 2006). In particular, secondary school education is an important sector in national and individual development. It plays a vital role in creating a country's human resource base at a level higher than primary education (Achoka, Odebero, Maiyo & Mualuko, 2007). In line with this, many countries have given priority to research on what happens in the classroom and how teaching and instruction influences students' learning. Recent reviews suggest that teachers' instructional practices make a difference to students' learning and it is more important than class size, classroom climate, and teachers' years of experience and formal training (Baumert et al., 2010; Bryk, Sebring, Allensworth, Easton, & Luppescu, 2010;

Konstantopoulos & Chung, 2011). Studies indicated that the impact of both teacher characteristics and instruction is stronger than previously assumed, while there seems to be agreement that teacher instruction matters but the field still lacks knowledge about how and why teachers' different instructional practices relate to students' learning (Lipowsky et al., 2009).

It has been proved that teachers have an important influence on students' academic achievement in the sense that they play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy (curriculum) into action and principles based on practice during interaction with the students (Afe, 2001). In their study, Wright, Horn and Sanders (1997) concluded that the most important factor influencing student learning is the teacher. Teachers stand in the interface of the transmission of knowledge, values and skills in the learning process. If the teacher is ineffective, students under the teacher's tutelage will achieve inadequate progress academically. Business studies helps to develop a business culture, which is vital for promoting economic development, equip students with skills necessary for a successful business career and further lead to the acquisition of attitudes that are necessary for success in modern business practice. In relation, student academic achievement is important in determining the quality of business programme offer in the school. However, students' performance in the subject has not been encouraging and it has become a perturbation issue for stakeholders in Ghana. WAEC Chief Examiners' report (WASSCE 2015) recorded that students' performance in Business studies has not been encouraging. This poor performance has been attributed to several factors like, ineffective use of teaching and learning materials, poor use of teaching methods, large class size, teacher quality, lack of supervision, among others (Hymel, 2006; Sherman et al., 2008; Kimanil et al., 2009; Koopman, 2017). Among these factors, teacher-related factor stands to be the most important that influence students' achievement (Seidel & Shavelson, 2007; Timperley & Alton-Lee, 2008; Hattie, 2009). Per this, Business studies teachers' instructional practices are the key to achieving desired student outcomes for developmental programs. Internationally, several studies have been conducted on teachers' instructional practices. Wenglinisksy (2001) studied about Teacher Classroom Practices and Student Performance. The study found that the effects of classroom practices, when added to those of other teacher characteristics, are comparable in size to those of student background, suggesting that teachers can contribute as much to student learning as the students themselves. In a related study, Morgan et al., (2008) investigated the

instructional practices that most helped first Grade Teachers with and without mathematics difficulties. Their study revealed that the largest predicted effect for a specific instructional practice was for routine practice and drill.

In Ghana, several studies have been conducted on factors influencing students' academic performance. Davis & Agbenyega, (2012) investigated the language policy and instructional practice dichotomy. Their study revealed that qualitative analysis of the results revealed what appeared to be gaps between what the policy says and what the research participants do in their schools. In a related study, Donkor & Asante (2015) investigated the Instructional Leadership of Basic Schools in Ghana. They found that supervision, evaluation, and direct personal support activities were found to be more dominant in the basic schools than curriculum planning, organization and delivery. Mensah (2012) conducted a study on factors that influence the performance in general knowledge in art of senior high school students. It was revealed that the reasons for school A's success at WASSCE is as a result of the availability of teaching learning resource, high teacher competency, experienced teachers; and the attraction and admission of high performance BECE applicants into the Visual Arts and Art-related departments. Also Adane (2013) conducted a study on factors affecting low academic achievement of pupils in Kemp Methodist junior high school in Aburi. The study revealed that the issue particular to Kemp Methodist junior high School (low academic achievements of pupils) was attributed to teachers, school environment, parents and the pupils themselves.

However, it appears that these studies were conducted on other subjects such as mathematics, languages, science, and general knowledge in arts, among others in the senior high school. It appears that only a little study has been conducted on business teachers' instructional practices and how they relate to student academic performance. It is against this background that this study was conducted to examine the relationship that exists between instructional practices and students' achievement in business in Komenda/Edina /Eguafo /Abrem Municipal (KEEA).

II. LITERATURE REVIEW

Element of Instructional Practices

Pedagogical Content Knowledge: Shulman (1987) defined Pedagogical content knowledge as teachers' interpretations and transformations of subject-matter knowledge in the context of facilitating student learning. He further proposed several key elements of pedagogical content knowledge: (1) Content knowledge; (2) Understanding of students conceptions of the subject; (3) General pedagogical knowledge; (4) Curriculum knowledge; (5) Knowledge of educational context; and (6) Knowledge of the purposes of education. Pedagogical Content Knowledge is the integration of subject expertise and skilled teaching of that particular subject (Shulman, 1986). It is an idea rooted in the belief that teaching requires considerably more than delivering subject content knowledge to students, and that students' learning is considerably more than absorbing information for later accurate regurgitation (Loughran, 2012). Several studies have been conducted on the relationship between pedagogical content knowledge and students' academic achievement.

Staub et al., (2002) in a longitudinal study of 496 students in 27 self-contained German elementary school classrooms, measured the performance in mathematical word problems and arithmetic tasks at the end of Grades 2 and 3. Their findings showed that a cognitive constructivist orientation was associated with larger achievement gains in mathematical word problems. Moreover, teachers with a direct transmission view were not more successful than teachers with a cognitive constructivist orientation in fostering students' computational proficiency. Hill et al., (2008) drawing on the work of Shulman (1986), presented a conceptualization of the pedagogical content knowledge and content knowledge of secondary-level mathematics teachers. They described the theory-based construction of tests to assess these knowledge categories and the implementation of these tests in a sample of German mathematics teachers (N=198). Analyst investigated whether pedagogical content knowledge and content knowledge can be distinguished empirically, and whether the mean level of knowledge and the degree of connectedness between the two knowledge categories depends on mathematical expertise. Findings showed that mathematics teachers with an in-depth mathematical training (i.e., teachers qualified to teach at the academic-track Gymnasium) outscore teachers from other school types on both knowledge categories and exhibit a higher degree of cognitive connectedness between the two knowledge categories. Park et al., (2012) researched on teachers' professionalism and professional development and its increase in the last two decades. A main focus of this line of research has been the cognitive component of teacher professionalism, i.e., professional knowledge. Most of the previous studies on teacher knowledge such as the Learning Mathematics for Teaching (LMT) (Hill et al. 2004), the Professional Competence of Teachers, Cognitively Activating Instruction, and Development of Students' Mathematical Literacy (COACTIV) (Baumert et al. 2010), and the Mathematics Teaching in the 21st Century (MT21) (Schmidt et al. 2007) studies have been conducted in the field of mathematics teachers' pedagogical content knowledge (PCK) and content knowledge (CK). In particular, this study describes a method to develop reliable, objective, and valid instruments measuring teachers' CK and PCK in four steps by the use of empirical data of students. Additionally, the study explored whether CK and PCK might be measured as separate knowledge categories by using a paper-and-pencil test. This paper presents a theoretical model that guides test development and provides steps to develop and validate the instruments. This suggests that the new instruments (paper-and-pencil test) can be used in combination with classroom observations to examine teaching quality and further its relation to student learning. According to Fischer et al., (2012) teachers' professional knowledge is assumed to be a key variable for effective teaching. As teacher education has the goal to enhance professional knowledge of current and future teachers, this knowledge should be described and assessed. They designed a test instrument to assess the professional knowledge of physics teachers (N=186). A model describing the relationships between these three dimensions of professional knowledge was created to inform the design of the tests used to measure CK, PCK, and PK. In this paper, they described the model with particular emphasis on the PCK part, and the subsequent PCK test development and its implementation in detail. They reported different approaches to evaluate the PCK test, including the description of content

validity, the examination of the internal structure of professional knowledge, and the analysis of construct validity by testing teachers across different school subjects, teachers from different school types, pre-service teachers, and physicists. Their findings demonstrate that PCK test results could distinguish physics teachers from the other groups tested. The PCK test results could not be explained by teachers' CK or PK, cognitive abilities, computational skills, or science knowledge.

Teacher-student engagement

Teacher-student engagement is concerned with the interaction between the time, effort, and other relevant resources invested by both students and their institutions intended to optimize the student experience and enhance the learning outcomes and development of students and the performance, and reputation of the institution (Trowler, 2010). Willms et al., (2007) conducted a study on the relationships between students' engagement and academic performance. The study examined the extent to which students' engagement is associated with experimental and traditional measures of academic performance. The significance of the study is to explore possible strategies for improving school teachers' motivation. Many measures of students' engagement were linked positively with such desirable learning outcomes as critical thinking and grades, although most of the relationships were weak in strength. Students' performance remains at top priority for educators. It is meant for making a difference locally, regionally, nationally and globally. It is suggested that school administrators and teachers plan for a more conducive atmosphere and meaningful learning activities. Different age groups and genders among students need to be addressed differently to create a better learning environment in accordance with their emotional, psychological and cognitive development. In a developing country such as Nigeria, Students' engagement in school activities is a major factor in determining students' success in education, hence, the teachers need to undergo teacher training courses to obtain the necessary skill to dynamically engage students in classroom activities.

Steele (2003) examined the relationship between student engagement and academic performance, using U.S. data of the Program for International Student Assessment 2000. The sample comprised 3,268 fifteen-year-old students from 121 U.S. schools. Multilevel analysis showed that behavioral engagement (defined as effort and perseverance in learning) and emotional engagement (defined as sense of belonging) significantly predicted reading performance. The effect of emotional engagement on reading performance was partially mediated through behavioral engagement. Findings from the study suggested that educators, policy makers, and the research community need to pay more attention to student engagement and ways to enhance it.

III. RESEARCH QUESTIONS

In order to address the problem, the following research questions guided the study:

1. What is the relationship between teachers' pedagogical content knowledge and students' academic performance in business?

2. What is the relationship between teacher engagement of students in learning and student academic performance in business?

IV. RESEARCH METHODS

The researcher employed correlational design to examine the relationship that exists between Teachers' Instructional Practices (Pedagogical Content Knowledge, Instructional Resources, and Student engagement) and Students' Achievement in Business Education in the Public Senior High Schools in KEEA Municipal. The population of the study was all business students in the three public Senior High Schools in KEEA Municipal. The study specifically included only SHS 2 and SHS 3 students reading Business in these three public senior high schools because they have much experience in learning of Business, and have classroom experience of the instructional practices of their teachers and how they relate to their academic achievement. Therefore only 450 students were accessible to the researcher, during the 2018/2019 academic year.

The sample frame for the study was all Business form two and three students within KEEA municipal. A sample size of 135 was used. This sample size is 30% of the estimated accessible population. This was in line with the suggestion of Gay as cited in Gyimah and Duodo (2005) that, for quantitative studies, a sample size of 10% - 30% of the population is sufficient for generalization purposes.

Table 1- *Population and Sample size of estimated respondents*

Name of Schools	Population Size (N)	Sample Size (n)
Komenda Sec/Tech	146	44
Eguafo-Abrem SHS	153	46
Edinaman SHS	151	45
Total	450	135

Source: Field data, 2018.

A proportional allocation was used to determine and allocate the number of students from each school because the total number of students within the school was unequal. The sample was selected using probability sampling method, particularly simple random sampling technique (fish-bowl technique). This method was used to give each student an equal chance of being selected.

A Self-Developed questionnaire was used to collect data from Business students. The questionnaire was a close-ended type having five-point Likert scale labeled: strongly disagree (a value of 1), disagree (a value of 2), Neutral (a value of 3) agree (a value of 4) and strongly agree (a value of 5). The Likert scale gauges the degree to which there is agreement or disagreement with the statement representing a common issue. The questionnaire contained four sections; A, B, C and D. Section 'A' of the questionnaire sought the demographic data of the students. Sections 'B' sought to find answers to research question 1, Section 'C' found answers to research question 2 and the last section found answers to research question 3. The survey technique was used because it is an effective tool which enables large scale numerical

data to be obtained over a short period of time and can also be easily administered.

Data collected from the field was coded, edited, keyed into SPSS version 22. The data was processed using SPSS. The data was analyzed using only inferential statistics (correlation).

Table 2- *Data Analysis Plan*

Research Question	Tools for Data Collection	Tools for Analysis
Question 1	Questionnaires	Pearson Correlation
Question 2	Questionnaires	Pearson Correlation

V. RESULTS OF THE STUDY

Research Question One: What is the relationship between teacher pedagogical content knowledge and students' academic performance in business?

The research question one sought to find out the relationship between Teacher Pedagogical Content Knowledge and Students' Performance. In order to answer this research question, a five point likert-scale questionnaire was administered to students in the selected public Senior High Schools in the KEEA Municipal. The performance of students in Business in 2017/2018 academic year was also obtained in these selected schools. A correlation analysis was made to help predict the relationship between teacher pedagogical content knowledge and students' academic performance.

Table 5-*Relationship between Pedagogical Content Knowledge and Students' Academic Performance*

Statement	Correlation co-efficient
Teacher's way of teaching shows that the lesson was planned before coming to class	-0.009
Teacher introduces the lesson well to your understanding	-0.007
Teacher delivers lesson well to your understanding	0.080
Teacher cites relevant examples during lesson delivery	0.066
Teacher relates lesson to real life	-0.016
Teacher teaches from known topics to unknown topics	0.100
Teacher normally puts students into smaller groups	0.023

Table 6-*Relationship between Teacher Engagement of Students and Students' Academic Performance*

Statement	Correlation co-efficient
Teacher reviews student previous knowledge about the topic before starting the lesson	0.672
Teacher shares lesson objectives with the student	0.590

during lesson delivery to discuss issues relating to the lesson

Teacher responds very well to questions asked during the lesson	0.064
Teacher presents the lesson in a systematic way	0.007
Teacher varies the method used in delivery of content of the lesson to student	0.104
Average	0.0412

Source: Field Data (2019)

The analysis of the correlation for the research question one shows that Variation in the use of Method of Teaching has the highest degree of weak correlation (.104) with Students' Achievement. Teaching from Known Topics to Unknown Topics (.100) has the second highest degree of weak correlation with Students' Achievement. Good Lesson Delivery (.080), Citing Relevant Examples by the Teacher (.066), Teacher's Response to questions (.064), Grouping of Students into smaller groups by the teacher (.023), Systematic Presentation of Lesson (.007), Good Introduction of Lesson by the teacher (-.007), Planning of Lesson before delivery (-.009), Relating Lesson to real Life (-.016) has the lowest level of weak correlation with Students' Achievement.

The result of the present study shows a weak correlation between Teacher Pedagogical Content Knowledge and Student Academic Performance. This indicates that students' performance is not equally affected by Pedagogical Content Knowledge. The weak relationship could be as a result of the characteristics of the respondents (area of study, geographical location and personal traits). The reason for this is manifested in Areelu (2018) who found that the result, $F(2,387) = 0.56$; $P = 0.67$ revealed that all categories of the subject were equally affected by Teacher Content Knowledge. However, $F(2,387) = 12.91$; $P = 0.00$ indicated that students were not equally affected by Teacher Pedagogical Knowledge.

Research Question Two: What is the relationship between teacher engagement of students in learning and student academic performance in business?

The research question two sought to find out the relationship between teacher engagement of students in learning and students' performance. In order to answer this research question, a five point likert-scale questionnaire was administered to students in the selected public Senior High Schools in the KEEA Municipal. The performance of students in Business in 2017/2018 academic year was also obtained in these selected schools. A correlation analysis was made to help predict the relationship between teacher engagement of students in learning and students' academic performance.

Teacher seeks the views of student about the topic for the lesson	0.873
Teacher gives ample time during the lesson for student to ask questions	0.454
Teacher uses appropriate methods of teaching to engage student during the lesson	0.791
Teacher encourages student to pay attention during lesson delivery	0.500
Teacher communicates very well during lesson delivery	0.384
Teacher encourages student to ask questions in class	0.563
Teacher engages student very well during the delivery of the lesson	0.832
Teacher always welcome student ideas during lesson delivery	0.590
Average	0.6249

Source: Field Data (2019)

The analysis of the correlation of research question two shows that almost all the variables except Teacher Communication with Students have a strong/ moderate relationship with students' achievements. Seeking Students views about the Topic has the highest degree of correlation (.873) with student achievement. Engagement of Students during Lessons (.832), Appropriate Methods used in Students Engagement (.7911), Reviewing Student Previous Knowledge by the Teacher (.672), Sharing of Lesson Objectives with Students (.590), Teacher's Appreciation of Students' Ideas (.590), Teacher Encourages Students to ask Questions (.563), have a strong correlation with Students' Academic Performance. Teacher Encourages Students to pay attention in class (.500), Teacher gives opportunity to students to ask questions (.454) and Teacher communication with students (.384) have moderate level of correlation with students' performance. The results of the present study show a strong correlation between Teacher Engagement of Students and Students' Performance. The reason for this significant relationship is best manifested in Willms et al., (2007) who found that students' engagement in school activities is a major factor in determining students' success in education, hence; teachers need to undergo teacher training courses to obtain the necessary skill to dynamically engage students in classroom activities. Also, Steele, (2003) multilevel analysis showed that behavioral engagement (defined as effort and perseverance in learning) and emotional engagement (defined as sense of belonging) significantly predicted reading performance. The effect of emotional engagement on reading performance was partially mediated through behavioral engagement. Findings from the present study suggested that educators, policy makers, and the research community need to pay more attention to student engagement and ways to enhance it.

In summary, there is a relationship between the two variables (Pedagogical Content Knowledge and Teacher Student Engagement) and Students' Academic Achievement in Business in the selected public Senior High Schools in KEEA Municipal. However, Pedagogical Content Knowledge has a weak relationship with Students' Academic Performance in Business, while Teacher Student Engagement has a strong/moderate

relationship with Students' Academic Performance in Business in the selected public Senior High Schools in KEEA Municipal.

VI. DISCUSSION

The main purpose of this study was to examine the relationship that exists between instructional practices and students' achievement in business as a programme, specifically, in the public senior high schools in Komenda/ Edina/Eguafo/Abrem Municipal (KEEA) in the Central Region of Ghana. Findings revealed that Pedagogical Content Knowledge and Students' Academic Performance in Business, the study found that there is a relationship that exists between these two variables, but this relationship was found to be weak. According to the result from the analysis, Pedagogical Content Knowledge of the Teacher was seen as less influence on Students' Performance in Business. On Teacher Engagement of Students and Students' Academic Performance in Business the study found that there is a strong relationship between these two variables. It means Teacher Engagement of Students has more influence on Students' Academic Performance in Business as compared to PCK.

The study also found that there is a relationship that exists between the use of Instructional Resources and Students' Academic Performance in Business. The relationship between these two variables is a strong one which means that the use of instructional resources has a great influence on students' academic performance in Business.

VII. CONCLUSION

The findings of the study show that there is a relationship between the three variables (Pedagogical Content Knowledge, Teacher Student Engagement and Instructional Resources) and student academic achievement in Business in the selected public Senior High Schools in KEEA Municipal. Though the study found a weak relationship between PCK and students' achievement in Business, it does not necessarily mean that student performance is not totally independent on PCK. The weak relationship could be as a result of the characteristics of the respondents (area of study, geographical location and personal traits).

Teacher Student Engagement and the use of Instructional Resources have a greater influence on Students Academic Performance and can therefore be concluded that teachers should effectively engage their students during lesson delivery and also adopt the culture of using various instructional resources in their lesson delivery to enhance the performance of students in Business.

VIII. RECOMMENDATIONS

Based on the key findings and the conclusions drawn, the following recommendations are made:

1. Policy makers/School Heads should periodically organize workshops and in-service training for teachers to be educated on appropriate teaching styles that can be adopted for the teaching and learning of Business in the Senior High School.
2. School Heads should monitor teachers to implement strategies that will involve students in the teaching and learning process, and Teachers should also develop the habit of engaging their students during lesson delivery through crafting of teaching and learning activities in the process of lesson delivery.

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The Effects of Kindship System in Judicial Perception in Handling Cases of Violence against Women

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Abstract:

The phenomenon of violence against women is increasing with all kinds of diverse forms of violence. There are still many Indonesian women who find it difficult to access legal justice when they are victims in cases of violence. The legal culture of judges needs to be studied in depth given the judges' decisions that are very diverse and far from a sense of justice in cases of violence against women. Moreover, the principle of the benefits of the decisions are often perceived as not fulfilling a sense of justice both by justice seekers and the community. The specific purpose of this study is to obtain in-depth information on the impact of existing values on the kinship system that forms the basis of life, perception and judges understanding of the law, especially in giving decisions on cases of violence against women. This research is expected to contribute to one aspect of the legal system component, namely the legal culture component, in order to enrich judicial behavior theories to improve the conditions of the law enforcement process in Indonesia. This research is exploratory with an approach that is more directed towards empirical legal research by examining one aspect of the legal system component and aspects of the legal structure about the impact of the kinship system on the perception of judges in cases of violence. This research was conducted in the East Java High Court and Denpasar, because these two locations have different kinship systems, namely Java with a parental system and Bali with a patrilineal system. The kinship system adopted by the judge determines the judge's perception so that it will be reflected in his decision. For this reason, studies in the field of legal culture both among law enforcement, executive and legislative bodies need to be carried out so that the results can be used as material to increase knowledge in the legal aspects.

Keywords: Violence against women, legal culture, kinship system and judicial behavior.

Introduction

The phenomenon of violence against women is increasing with all kinds of diverse forms of violence. In the annual record of the National Women's Commission in 2010, the number of violence against women reached 105,103 cases and 96% of them occurred in private area. Behind this number, it turns out that for years women victims of violence have had difficulty in accessing justice. There are still many Indonesian women who find it difficult to access legal justice when they are victims in cases of violence.

In 2012, there were 8,315 cases (66%), while 34% were violence in the community and state domain. Of these, psychological violence was the highest form of domestic violence (46%), physical violence reached 28%, sexual violence 17%, and economic violence amounted to 8%. Another form of domestic violence that is currently being reported is in the form of marital crime.

In connection with reports of victims of violence against women and children who entered the police in Malang Police station, the case rose to 300% in 2008-2009. However, the case that came to the trial decreased because it was the parties who withdrew the case due to peace and one of the parties moved domicile (Ristanty and Indrayanti, 2009). Punishment for rape cases that only last for 3-6 months has not been maximized, and the verdict does not reflect a sense of justice for the victim. This is due to the ways in which they perceive violence against women themselves, whether the case of violence against women is considered a personal problem or as a complex social problem. In addition, factors outside the law are often also used as considerations in passing decisions by judges.

Legal culture of judges needs to be studied in depth given the judges' decisions which are very diverse and far from a sense of justice in cases of violence against women. The study of legal issues that only observe and emphasize the operation of the law according to formal procedures as outlined in the legislation, have not been able to explain fully and broadly how the community actually resolves the legal problems encountered, including in this case how the patterns of judicial behavior in give decisions that are influenced by the values they hold.

The specific purpose of this study is to obtain in-depth information on the impact of existing values on the kinship system that forms the basis of life, perception, and judges' understanding of the law, especially in giving decisions on cases of violence against women. Furthermore, we will try to find the differences and similarities of the kinship system adopted by the judges which are an internal part of the legal culture in giving decisions. This research is expected to contribute to one aspect of the legal system component, namely the legal culture component, in order to enrich judicial behavior theories to improve the conditions of the law enforcement process in Indonesia.

Literature Review

Concept of Legal Culture in Law Enforcement

Friedman (1975) revealed that there are three components of the legal system, namely: (1) structure, (2) substance and (3) culture. The structure consists of number and size of the court, its jurisdiction (the type of case being examined and the procedural law used), including in this structure also concerning the arrangement of the legislative body. Substance, namely the rules, norms and patterns of real human behavior within the system. Included in this understanding of the substance is also the "products" produced by people who are in the legal system - the decisions they make, the new rules they draft. Meanwhile, culture or legal culture, namely human attitudes towards law and the legal system - their beliefs, values, thoughts and expectations.

One very important type of group legal culture is the legal culture of legal professionals - the values, ideologies and principles of law enforcement. The behavior and attitudes of professionals have a big influence on the pattern of demands put on the system. A judge will decide in a certain way to satisfy the demands offered to him when he has an interest in doing the thing or group of his own age or values for it (Friedman, 1975).

Types of Kinship Systems

In Indonesia there are three kinship or kinship systems, namely matrilineal, patrilineal and parental kinship systems. Patrilineal is a community custom that regulates the flow of descent from the father's side. This word is often equated with patriarchy or patriarchy, although basically the meaning is different. Matrilineal kinship system is a kinship system that draws a lineage from the line of women (mothers). This system is adopted in West Sumatra (remote areas). It is a community custom that regulates the flow of descent from the mother's side. While the parental kinship system is a kinship system that draws a lineage from the line of men (fathers) and women (mothers). This system is practiced in Java, Madura, South Sumatra and others. Although in Indonesia there are three kinship or kinship systems, the power remains in the hands of men as a result of the influence of patriarchal ideology.

The matrilineal kinship system adopted in the Minangkabau community in West Sumatra is the oldest kinship system. This kinship system places a high status of women and is a successor to offspring and in inheritance law as well as heirs. In the Minangkabau community, although the lineage is drawn from the line of women (mothers) but the power remains in the hands of men. In the patrilineal kinship system is adopted by the people of Tapanuli, Lampung, Bali and others. It is very clear that men are placed in a higher position. Men have the position of heirs, as a continuation of family names, as successors to offspring, as members of indigenous peoples and also have a role in family and community decision making. In a society that adopts a partilinal kinship system, women are the opposite, that is, having a very low position, not as an heir, not as a descendant, not as a successor to the family name because in honest marriage (in general) women follow their husbands and also do not become members culture.

Concepts and Forms of Violence Against Women

Violence means an attack on a person's physical or psychological mental integrity. The types of violence according to the Law are physical, psychological and economic violence. Therefore violence does not only involve physical attacks such as rape, beatings and torture but also non-physical ones such as threats, sexual harassment and coercion so that women or men emotionally feel disturbed in their hearts. While economic violence felt by women (wives) in the form of not being provided with a living from a husband, can occur because the husband is unemployed, small income or wasteful. As a result, it is not uncommon to cause quarrels in the household until physical violence occurs.

Theories of Judicial Decision Making

One of factors influencing judicial behavior is structural variable, which is the factor of regulations regarding procedures and jurisdiction, etiquette and court customs. Another explanation is because of law itself. Judges adhere to legal principles or listen to better legal arguments. For individual cases and in the short term, these factors are important and even greater than the impact of the values and attitudes of judges and the pressure of particular interests and events.

Based on behavioral techniques, political scientists view the judges themselves as the key determinants, especially their attitudes and values. They also use scaling to measure sensitivity to several factors such as the economy, civil liberties, sympathy for marginalized parties and so on. Judges have values, attitudes and intuitions, but they also play the role of judges and this role requires them to play the game of law. In a review like this, judges are also a product of an institutional setting in addition to their products.background

There is diversity between judges and courts. Some courts follow economic, social or political flow as does the North-South boundary line in the United States. It is not easy to find out the contents of the judges' heads. A study conducted by Glick (1971) raises initial expectations. He interviewed judges who served in four courts in New Jersey, Massachusetts, Louisiana and Pennsylvania. Judges have very diverse attitudes. Glick for example asked, "How do non-legal factors influence decision making in a case? How important are these things? Every member of the New Jersey court said "very important". Judges of Louisiana, except for one, said that these factors were not important at all. From Glick's interview came a picture of the four trials. New Jersey is the seat of legal realism; judges in the other three states generally have a more conservative mindset.

In another study, Daynard (1971) examined three hundred cases in three mid-level courts to see the style used by these courts in deciding cases. He distinguished six styles. Three of them are narrow - limited to the precedent or facts about the case or the applicable law; the other three are wider.

Levin (1972) filters data about the behavior of judges in sentencing in two cities, Minneapolis and Pittsburgh USA. Levin found differences in the behavior and attitudes of Pittsburgh judges, generally giving lighter sentences than judges in

Minneapolis. Judges in Minneapolis are more oriented towards the community's need for protection and towards their professional goals rather than to the suspect. On the other hand, judges in Pittsburgh are oriented to the suspect and to the provision of punishment or efforts to prevent crime.

Verdict Research on Cases of Violence against Women

Many cases of sexual violence against children are difficult to prove in court, especially children aged 16-17 years because of using the Child Protection Act. While for children under the age of 15, many use the Criminal Code (KUHP). Not all judges have the perspective and sensitivity of gender and children's rights, so that there are still judges' decisions and prosecutors' demands that have not been able to fulfill the sense of justice for victims, including rape cases with 3 perpetrators by the Sleman District Court.

A sexual abuse case in Wates District Court was prosecuted for 2 years and the panel of judges decided for 1 year and 3 months. This happens because of assumptions among judges and prosecutors, especially for cases of sexual violence for children over the age of 15 years who are considered to have grown up and contributed to the occurrence of rape, while the age is still not even 18 years.

The attitudes of law enforcement officers are still found to assess victims from the physical side and external appearance. According to them the victim should show a sad attitude, not caring for themselves, stressed, depressed or a picture of bad things. As a result, the demands are not optimal and the decision is not more than 2 years.

A study conducted by Ristanty and Indrayanti (2009) on the perception of law enforcement officers in rape cases in the Malang District Court shows that the verdicts were not yet maximal because they only ranged 3-6 months and did not reflect a sense of justice for victims. This is due to how they perceive violence against women themselves whether considered a personal problem or as a complex social problem. There are several factors that are used as a basis for consideration by judges to the convicted person, such as: during the trial the defendant behaves politely, the perpetrators of domestic violence (KDRT) are the husband who acts as a breadwinner. Thus, factors outside the law are often also taken into consideration in passing decisions by judges. In order to make sure that the elements of justice and expediency can be reflected in the judges' decision, the judge, in addition to understand the domestic violence law needs to have a further understanding of domestic violence cases, namely how a phenomenon is accepted will determine the response to it. When a violence is conceived as a problem, the response will lead to a solution.

Violence against women in many forms is rarely accepted by the government as a problem that requires important action. When violence occurs at home, it is seen as a personal problem and must be resolved in a family way. When violence occurs in the community naturally, it will be underestimated or treated as a moral problem of the woman and her behavior is blamed. Violence that happens to women has not been seen as a problem like crime. So the first step that must be agreed is that violence against women should be accepted and understood as social problems. When violence against women begins to be defined as a social problem rather than a personal problem, it will become clear that our understanding is still limited. The cause of violence is still unclear, if not controversy and seen differently by a variety of professionals, cultures and even gender actors. In-depth understanding that needs attention due to the violence itself most of the attention is directed at victims not on others such as family and society. Because it will be very useful as the concept of the problem impacts the involvement of the government sector so as to make our understanding deeper into the whole problem.

A general theory of judicial decision making cannot ignore social forces. This means that special studies that discuss the impact of the kinship system on judicial perceptions need to be done up to now. So that the results of this study will enrich the theory of legal system components, especially in the aspect of legal culture.

METHODOLOGY

This research is an exploratory one since the study is related to the culture of law in the environment of law enforcement officers. The approach used in conducting this research is more directed towards empirical legal research by examining one aspect of the legal system component and aspects of the legal structure regarding the impact of the judge's kinship system on judges' perceptions in violent cases.

This research was conducted in the East Java High Court and Denpasar, because these two locations have different kinship systems, namely Java with a parental system and Bali with a patrilineal system. The population in this study are the judges in the East Java and Bali District Courts. Whereas the sample location to be chosen was determined purposively, namely for East Java are Malang District Courts, Pasuruan and Banyuwangi and the Bali District Courts of Denpasar, Singaraja and Tabanan. This is because there is prior information that says that the courts have handled cases of violence against women.

This study uses two kinds of data in the form of primary data and secondary data. The stages of primary data collection are done in two steps. The first step is to use interview techniques with closed and open ended questionnaire questionnaires. The second technique is to conduct focus group discussion (FGD), which is a more focused group discussion to get more in-depth information, especially related to the background of the experience of the judges, the values adopted and their perception in deciding cases of violence.

After the data is collected it will be analyzed using a qualitative descriptive method that is describing the information obtained so that a concrete description of the presence or absence of the kinship system affects the perceptions of judges in giving decisions on cases of violence against women. Furthermore, the analysis was carried out using a comparative approach to describe the similarities and differences in the impact of the kinship system on the perceptions of judges.

RESULTS AND DISCUSSION

Based on Table 1, out of 9 judges there were 5 Muslim judges, 2 Hindu and 2 Christians. There were 2 judges from Bali, 2 from Sumatra, 1 from NTT and 1 from Makassar and 3 from Java.

Table 1. Kinship and Religion Embraced by the Judge

Number	District Court	Gender	Kinship system	Religion
1.	Pasuruan	Male	Patrilineal (Batak)	Christian
2.	Malang	Female	Patrilineal and Parental (NTT and Java)	Islam and Islam
3.	Singaraja	Female and Male	Patrilineal (Bali) and Parental	Hinduism and Islam
4.	Tabanan	Female	Patrilineal (Bali)	Hinduism
5.	Denpasar	Male	Patrilineal (Tapanuli)	Christian
6.	Banyuwangi	Male	Patrilineal (Makasar) and Parental (Kediri, East Java)	Islam

Related to which element is more prioritized in giving decisions, it turns out that out of 9 judges, there were 4 judges who gave an opinion that the priority element was the principle of justice. Meanwhile, judges who said that all elements are used were 3 judges, 1 judge chosen legal certainty and benefits (Table 2).

Table 2. Elements of Non-Legal Elements that are Prioritized in the Decision

Number	District Court	Gender	Elements of Decision Certainty, Fairness and Expediency	Non-Legal Elements
1.	Pasuruan	Male	Expediency	Very important
2.	Malang	Female	Fairness and all (2 judges)	Very important
3.	Singaraja	Female and Male	Fairness and fairness	Very important
4.	Tabanan	Female	All	Important
5.	Denpasar	Male	All	Very important
6.	Banyuwangi	Male	Fairness and legal certainty	Very important and depends on the case

All judges interviewed said that the non-legal element is very important factor and had an effect on the judge in giving a decision. There were 2 judges who stated the verdicts depended on the facts in the trial and the motives of the perpetrators. Meanwhile, 6 other judges said the verdict was lighter than the prosecutor's demands and only 1 judge said the verdict was the same or even higher than the prosecutor's claim (Table 3).

Table 3. Verdict by Court

No.	District Court	Origin of Judge	Sanction Category	Perception about Law: Laws, judges' decisions and institutionalized values or behavior
1	Pasuruan	Batak	Lighter than prosecutors demand	All
2	Malang	NTT and Jogja	Lighter than prosecutors demand	All
3	Singaraja	Bali and Jogja	Lighter than prosecutors 'demands and not always under prosecutors' demands: sometimes the same	All
4	Tabanan	Bali	It depends on the facts at the trial	All
5	Denpasar	Tapanuli	Depending on the case and motives of the perpetrators	All
6	Banyuwangi	Makassar and Kediri	Lighter	All and only number 1 and 2

Judges' understanding of the concept of law turns out to almost all say that the law includes laws, judicial decisions and institutionalized values or behavior in society. Only 1 judge believes that the law includes the law and the judge's decision, while the institutionalized values of behavior are difficult to categorize as law.

Based on the results of interviews conducted with 9 judges from 6 District Courts who have handled cases of violence against women, it turns out that there are some findings that are quite interesting to be used as a study material related to the impact of the kinship system adopted by the judge. In connection with the judges' answers about the elements or principles prioritized in the decision, apparently out of 5 judges there were 3 judges who gave answers to the priority element of justice. Others said the three elements were taken into consideration in their decision. Theoretically, each judge's decision should reflect the three elements proportionally. But in reality it is impossible for a judge's decision to consider all three elements. There must be a sacrifice if one element is prioritized, surely the other elements don't get enough attention.

Furthermore, 2 judges (Malang and Singaraja District Courts) who answered the priority element of justice came from the patrilineal kinship system. Judges from the community system who adhere to the patrilineal experience experience, subordinate treatment from men. When handling cases of violence that befall women in their decisions, they do use legal certainty as a basis for deciding a case, the values and experiences of women judges who are influenced by the patrilineal kinship system are also reflected in the decisions made.

On the contrary, one male judge who served in the Pasuruan District Court who came from the patrilineal system gave the answer that the priority was the benefit aspect because it was related to the matter of the decision. While legal certainty is related to the legal process, namely the issue of proof and legal justice takes into account the aspects of the background and accompanying circumstances.

Furthermore, regarding the influence of non-legal elements on the judge's decision, it turned out that all the judges considered it is necessary to be used as a consideration in making decisions and the judges argued that non-legal factors were very important especially in cases of violence against women. Because in the hearing, the victims and their families usually ask for leniency on the perpetrators, which in fact are mostly the husband of the victim. The reasons given varied so that the judge decided to calculate non-legal factors. So it was not merely legal certainty. In a judge's decision the element of legal certainty is indeed used as a basis but the decision is handed down by considering many things including non-legal elements.

Likewise, the sanctions given turned out in practice from 9 judges of whom 5 judges said the verdict was lighter than the prosecutor's demands. Only 1 judge said it was not always the same as the prosecutor's demands and was always more severe whereas 2 judges gave explanations that it depends on the case and facts in court or in other words it can be lighter or vice versa. In connection with the existence of the perception of 1 judge who firmly said that the decision handed down was not always lighter. It means that the judge decided that cases of violence against women were always more severe than prosecutors demanded. This finding is interesting because the judge who gave his opinion came from the parental kinship system (Javanese: Jogja) which put forward the element of justice. So it can be predicted that the reason given has to do with the answer given in the question: which of the three elements (certainty, fairness and usefulness of law) takes precedence in giving a decision? Because the judge chose the element of justice on the grounds that in cases of violence against women there were strong parties (men) and weak parties (women). The weak party must be protected which is the sense of justice.

There are other findings that shows similarity of answers related to judges' perceptions about the law including laws, judges' decisions and institutionalized values or behavior, that the three items above are legal. Likewise, the decisions handed down by the judges tend to be lighter than the demands of the prosecutors. That was due to the influence of non-law which was considered by the judges. However, the findings of a judge who gave a decision is not always lighter in the sense that there is a judge who gives the same decision as the prosecutor's demands. The judge gave the reason that in cases of violence against women, there were two parties confronting, namely the strong and the weak.

Relating to internal and external cultural factors of judges that have a significant impact on decisions in violent cases, it is still necessary to conduct further in-depth studies. This is in the sense that the questions and material submitted should more specifically explore non-legal aspects and principles in decisions as well as the impact of the internal environment of the personal, work environment as well as the environment outside the work of judges need to be further explored.

There are several external environments or environments experienced felt by the judges which turned out to have an impact in making decisions. In this study, judges from patrilineal and parental kinship systems did not consider the same elements prioritized in the decision. So there are values obtained by judges of the kinship value system adopted also gives color in the decisions given. Where as many as 4 judges prioritize a sense of justice in their decisions, 1 benefit, 1 legal certainty and 3 judges said all elements take precedence.

The kinship system adopted by the judge determines the judge's perception so that it will be reflected in his decision that the judge should be able to filter which of the values that he adheres to harm or benefit all justice seekers. The term given by the judge that the kinship system is like a infant carrying that affects the way of thinking of a judge, for example between the norm and the judge's way of thinking which is sometimes contrary to the law. Then these things can become obstacles or obstacles to the verdicts handed down.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the study after conducting interviews with judges in 6 regions of the District Court, it can be concluded that: 1) The values held by the judges greatly influence the perception in giving decisions in cases of violence against women, 2) There are several differences and similarities in the choice of decisions from judges with different kinship backgrounds as follows: The difference is: 4 judges prioritize a sense of justice in their decisions, 1 judge chooses an element of legal advantage that is prioritized, 1 judge chooses legal certainty and 3 the judge said that all the elements take precedence. As a

result, it will affect the sanctions imposed in which there are 4 judges whose verdicts are lighter than the demands of the prosecutor and 1 judge are the same and the rest depends on the facts and motives of the perpetrators. Whereas the similarity of all judges with different background of kinship uses the norm for legal certainty, 3. Internal and external factors of legal culture have significant impact on decisions in violent cases, 4) The impact of the kinship system on the perception of judges of the special decision in the domestic violence case can actually make a significant contribution to the aspects of legal culture in Indonesia. For this reason, studies in the field of legal culture both among law enforcement, executive and legislative bodies need to be conducted so that the results can be used as material to increase knowledge in the legal aspects.

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Out-of-sample forecasting of the Region XII, Philippines' non-metallics production volume using different modeling techniques

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Abstract- This research paper investigates the accuracy of seven time series methods for short-term production volume forecasting. Different methods are compared to measure the forecasting performance on the monthly production volume of the Region XII, Philippines during the 2017-2019 period. The findings revealed that even the autoregressive integrated moving average (ARIMA) model performed well on the given data, but, overall, the best results were achieved with seasonal naïve method. This would lead us to conclude that even with little domain knowledge, simpler methods can outperform complex alternatives.

Index Terms- Philippines; Production; Forecasting; Mining; Natural Resources; Non-metallics

I. INTRODUCTION

One of the main indicators to measure the economic growth of a region in the Philippines is mineral production. The Board of the Philippine Statistics Authority (PSA) highlights the indicators mandated by the government to monitor the environmental, social, economic, political, and cultural developments at the regional level (PSA Resolution No. 10, Series of 2017). In this research, we are focusing on Region XII's non-metallics production quantity over the three-year period. According to the Organization for Economic Co-operation and Development (OECD), a non-metallic mineral commodity refers to a mineral usually having a dull luster, generally light-colored, transmits light, usually giving either colorless or light-colored streak from which a non-metallic element can be extracted for a profit such as a limestone, sand and gravel, clay, marble, silica, etc (OECD, 2001). The significance of this study to economic, social development, and technological is quite obvious (Pierdzioch C, Stadtmann G., 2013). Increasing demand for mineral goods and services result to economic expansion of developing countries. Hence, the future behavior of non-metallics production volume is vital for all agents of economy.

Region XII also known as SOCCSKSARGEN, is home to four provinces and one city composed of South Cotabato, Cotabato Province, Sultan Kudarat, Sarangani, and General Santos City. Using the non-metallics production data collected from different local government units (LGUs) from these provinces, consolidated by the Mines and Geosciences Bureau (MGB) Region XII, the main aim of the study is to develop, train, and evaluate linear and non-linear mathematical time series models. Forecasting is the prediction of future events. One way to forecast is via quantitative forecasting which is designed to predict the future value of a time series model with minimum data (Schnarrs, 1984). We also investigate seasonality in a de-trended macro-economic time series that often accounts to the movements of the production volume. Studies on the Philippines mineral production volume is quite scarce. Different analysts of market data mostly deal with forecasting mineral commodity prices instead of the production itself. One paper that forecast mineral production applies thermodynamics and Hubbert peak analysis in predicting mineral resources depletion (Valero, A. and Valero, A., 2010). They used the exergy analysis of minerals to forecast earth's physical stock of minerals and concluded that the peak of production might be reached before the end of the 21st century. Another study introduced the use of three-dimensional analytical model that can predict sanding onset from open hole wellbores (Al-Shaiibi, S., Al-Ajmi, A., Wahaibi, Y., 2013). It concluded that the develop model can be utilized as an approximation tool for perforated wells and predict onset pressure from wellbores.

As there are many different methods to forecast a phenomenon, a study revealed that no technique performs consistently well and better for all types of data (Lawrence, Edmundson, and O'Connor, 1983; Gardner and Dannenbring, 1980). Thus, more often than not, simple forecasting methods have better accuracy in forecasting than complex models (Armstrong, 1986; Lawrence, 1983).

II. METHODOLOGY

The Non-Metallics Production Dataset from the Department of Environment & Natural Resources – Mines and Geosciences Bureau Region XII is utilized and used with permission. The dataset contains only two variables, time and production quantity. The full dataset is shown below:

ID No.	Time	Production Quantity in '000 (cu.m.)
1	2017-01	172.0405
2	2017-02	179.775
3	2017-03	153.539
4	2017-04	133.3803
5	2017-05	153.783
6	2017-06	30.945
7	2017-07	149.444
8	2017-08	28.957
9	2017-09	13.6735
10	2017-10	164.7346
11	2017-11	208.5477
12	2017-12	79.9211
13	2018-01	180.7333
14	2018-02	225.7394
15	2018-03	329.4231
16	2018-04	477.6757
17	2018-05	334.8631
18	2018-06	289.3595
19	2018-07	250.1926
20	2018-08	195.1872
21	2018-09	201.5102
22	2018-10	310.0544
23	2018-11	251.4889
24	2018-12	265.797
25	2019-01	621.7637
26	2019-02	458.2238
27	2019-03	387.6178
28	2019-04	187.2189
29	2019-05	230.6134
30	2019-06	233.217
31	2019-07	332.2365
32	2019-08	232.0489
33	2019-09	129.2738
34	2019-10	348.5073
35	2019-11	234.2398
36	2019-12	280.9506

Table 1. Non-metallics production quantity in Region XII, Philippines.

The first variable deals with *time*. The second variable is the *production quantity in '000*. For example, the production volume in January 2017 is 172,040.50 cubic meters. In total, we are working on a 3-year time frame with a monthly non-metallics production data. Most of the non-metallics found and reported in Region XII are sand and gravel, limestone, boulders, and earth fills.

2.2 Training and Testing Set

For this study, the dataset is divided into two: 30 data points are used for training and 6 data points are taken for evaluation of the trained forecast algorithm. Thus, by forecasting the trained model on the unseen data, we can identify which model works and predicts best.

2.3 Implementation of the Different Forecasting Methods

As the aim of the study, we model the time series objects to collect and study past observations to develop an appropriate model to capture the structure of the series. The model is then used to create a forecast to generate future values. Different forecasting algorithms are compared for this study: Simple Average Method, Naïve Method, Seasonal Naïve Method, Regression Analysis, Stochastic Processes such as ARIMA Modeling, and Artificial Neural Network.

2.3.1 Basic Forecasting Methods

These models are pretty straightforward and directly implemented in the dataset as benchmark methods against more complicated algorithms.

Let y_1, \dots, y_T be the historical data, T be the time series object and h be the forecast horizon.

- Simple Average Method – Uses an average of all past training data to forecast the next values. The model is presented as

$$\hat{y}_{T+h|T} = \frac{y_1, \dots, y_T}{T}. \quad \#(1)$$

- Naïve – Uses the last period's actual value as a forecast. Thus,

$$\hat{y}_{T+h|T} = y_T. \quad \#(2)$$

- Seasonal Naïve Method – Use for highly seasonal data. Setting each forecast to be equal to the last observed value from the same season of the year.

Let m be the seasonal period, and k be the number of complete years in forecast period prior to time $T + h$.

The model function is written as

$$\hat{y}_{T+h|T} = y_{T+h-m(k+1)}. \quad \#(3)$$

2.3.2. Regression Analysis

Linear regression modeling is a powerful tool to explore causal relationships between events and predict future outcomes. That is why it is also widely used for forecasting. The simple linear regression model is given by the function

$$\hat{y} = b_1 X_1. \quad \#(4)$$

Where b_1 is the least square estimate of the slope associated with X_1 (without loss of generality and for convenience, the intercept is always 0). Based on simple linear regression, we can develop a more complicated model such as the multiple linear regression which is given by the model function

$$\hat{y} = c_1 X_1 + c_2 X_2 \quad \#(5)$$

Where c_1 and c_2 are the least-squares estimates of multiple linear regression parameters.

In this case, we use the Production Quantity as the response variable (y) and trend & seasonality ($X_1 + X_2$) as the explanatory variables. The linear regression model is used to study the effect and impact of trend and seasonality on the production quantity.

Then, carry-out cross validation techniques on how well the model fit on the unseen data.

2.3.3 ARIMA Modeling

ARIMA Model is also known as the Box-Jenkins methodology where it is used to identify and diagnose time series data with the ARIMA model (Box and Jenkins, 1976). The ARIMA model is the linear combination of past values and errors in forecasting the value of a variable. Let y_T be the actual value, p and q be the autoregressive and moving average, respectively, ε_T be the random error at T , and ϕ_i and θ_j are the coefficients. Hence, the forecast function is given by

$$y_T = \phi_0 + \phi_1 y_{T-1} + \phi_2 y_{T-2} + \dots + \phi_p y_{T-p} + \varepsilon_T - \theta_1 \varepsilon_{T-1} - \theta_2 \varepsilon_{T-2} - \dots - \theta_q \varepsilon_{T-q}. \quad \#(6)$$

ARIMA Modeling has three major steps: (1) *Model Identification*, (2) *Model Estimation*, and (3) *Diagnostic Checking*. We first check for stationarity via plotting. The order of differencing is decided by using an R Statistical Software called the *forecast package* in R. The *auto.arima()* function in R returns the best ARIMA model according to the performance metric of the AIC, AICc, or BIC value (Hyndman, 2008). The function conducts a search over a possible model within the order constraints provided. Thus, it tries all possible parameters for the given time series data and chooses a model that returns the lowest AIC, AICc, or BIC. The chosen model would be evaluated for further analysis.

2.3.4 Neutral Network in Time Series

The idea of ANN was first introduced in late 1943 by Walter Pitts and Warren S. McCulloch as a data processing unit for classification or prediction problems. A feed-forward neural network is consisting of an input layer, a hidden layer, and an output

layer. The number of neurons in the input layer is the number of input attributes in the training dataset. The link between these neurons is called *weights*. The network is then followed by a hidden layer and an output layer. A neural network is also a deterministic model. Thus, we will feed our training data in different parameter settings of the network architecture to find the optimal *weights*.

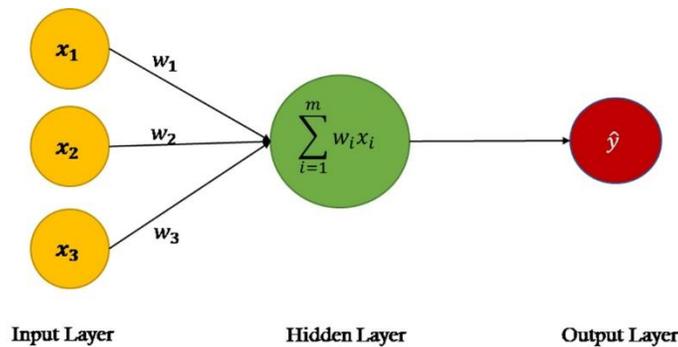


Figure 1. An example of a simple feed forward neural network adapted from “Single Neural Training” in Towards Data Science by Rojan Paleja, 2019, Retrieved May 22, 2020, from <https://towardsdatascience.com/single-neuron-training-3fc7f84d67d>.

The mathematical equation of the figure above is given by

$$y_i^{[l]} = w_i^{[l]Transpose} x + b_i^{[l]}, \#(7)$$

where l be the l th layer of the network, i the i th unit in the l th layer, w , b , and y are the weights, bias, and output, respectively. The weights and biases are *learned* from the data.

Time-series forecasts using neural network consists of a single hidden layer and lagged inputs for forecasting univariate time series. This is called a neural network autoregression or the NNAR model. The NNAR model is given by $NNAR(p, k)$ where p here is the lagged inputs and k nodes in the input layer. The best model is chosen according to the lowest AIC for the neural network model (Hyndman, 2008).

2.4 Performance Analysis

The success of an approximation algorithm depends on the performance, ease of implementation, and applicability.

It is important to note the kind of evaluation metric to use for measuring the forecasting effectiveness of the models. Every performance metric has its own advantages and disadvantages as elaborated more below (Adhikari & Agrawal, 2013).

In each definition, y_t is the actual value, f_t is the forecasted value, $e_t = y_t - f_t$ is the forecast error, and n is the test set size.

2.4.1 Mean Absolute Error (MAE)

The mean absolute error is defined by

$$MAE = \frac{1}{n} \sum_{i=1}^n |e_t|. \#(8)$$

Using the mean absolute error as an accuracy indicator has its own advantages and disadvantages. MAE is usually used as a metric because it captures the magnitude of the overall error. A good MAE value should be as small as possible. The main property of MAE is that it measures the average absolute deviation of the forecast values from original ones. The disadvantage of using MAE and relying solely on MAE is that many positive and negative errors do not cancel out. It results in not penalizing extreme error values.

2.4.2. Mean Absolute Percentage Error (MAPE)

The Mean Absolute Percentage Error is defined by

$$MAPE = \frac{1}{n} \sum_{i=1}^n \left| \frac{e_t}{y_t} \right| \times 100. \#(9)$$

The Mean Absolute Percentage Error (MAPE) represents the percentage of average absolute error that occurred. MAPE is independent of the scale measurement, but is affected by data transformation and scaling. Thus, it does not penalize extreme deviations and opposite signed errors do not offset each other. Also, the disadvantage of using MAPE is that it does not show the direction of error.

2.4.3 Mean Squared Error (MSE)

The Mean Squared Error is defined by

$$MSE = \frac{1}{n} \sum_{i=1}^n e_t^2. \#(10)$$

Mean Squared Error (MSE) is a famous forecast metric because it uses the average square deviation of forecasted values. As the opposite signed errors do not offset one another, MSE gives an overall idea of that occurred during forecasting. Compared to MAPE and MAE that do not penalize extreme value, MSE penalizes extreme errors occurred while forecasting. Hence, this forecast metric highlights the fact the total forecast error is affected by large individual errors, i.e., having one large error is much expensive than small errors combined. Also, MSE does not have any idea about the direction of the overall error. The disadvantage of MSE is that it is sensitive to scaling and data transformations. Thus, even if it is a good overall forecast measure, it is not easily interpretable as the other measures.

2.4.4 Root Mean Squared Error (RMSE)

The Root Mean Squared Error (RMSE) is defined by

$$RMSE = \sqrt{MSE} = \sqrt{\frac{1}{n} \sum_{i=1}^n e_t^2}. \#(11)$$

The properties of RMSE is the same as MSE.

2.4.5 The Theil's U-Statistics

Theil's U-statistics is defined by [9]

$$U = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n e_t^2}}{\sqrt{\frac{1}{n} \sum_{i=1}^n f_t^2} \sqrt{\frac{1}{n} \sum_{i=1}^n y_t^2}} \# \tag{12}$$

Theil's U-statistics is a normalized measure of the total forecast error. $0 \leq U \leq 1$; $U = 0$ means a perfect fit. As the same with MSE, this forecast metric is also affected by scaling and data transformation. A good Theil's U-Statistics value should be close to zero.

III. RESULTS AND DISCUSSION

Different forecasting algorithms are applied to the monthly production data set. Results are compared using different performance indicators such as the Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), and Theil-U's Statistic. These forecast accuracy metrics calculated the forecasted value and the actual production quantity. For these metrics, the lower the value, the more accurate the forecast model. The computations were implemented using R programming language under Windows 10 Operating System with Intel Core i7-2.50 GHz machine and on 8 GB RAM.

3.1 Summary Statistics

We first look at the plots of the time series object. A total of 36 data points is plotted in a monthly production dataset below from the Year 2017-2019.

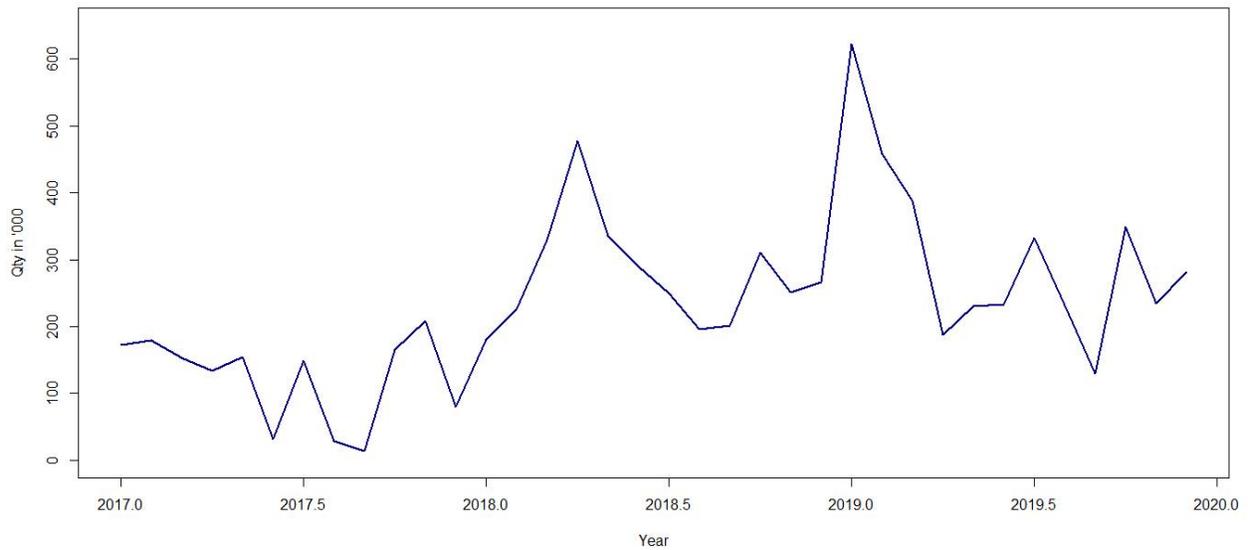


Figure 2. Monthly non-metallics production quantity over the years.

The non-metallics production series shown in Fig. 2 represents the monthly number of quantities from 2017-2019. The first 30 (i.e. January 2017 – June 2019) observations are used for training and the remaining 6 (i.e. July 2019-December 2019) for testing.

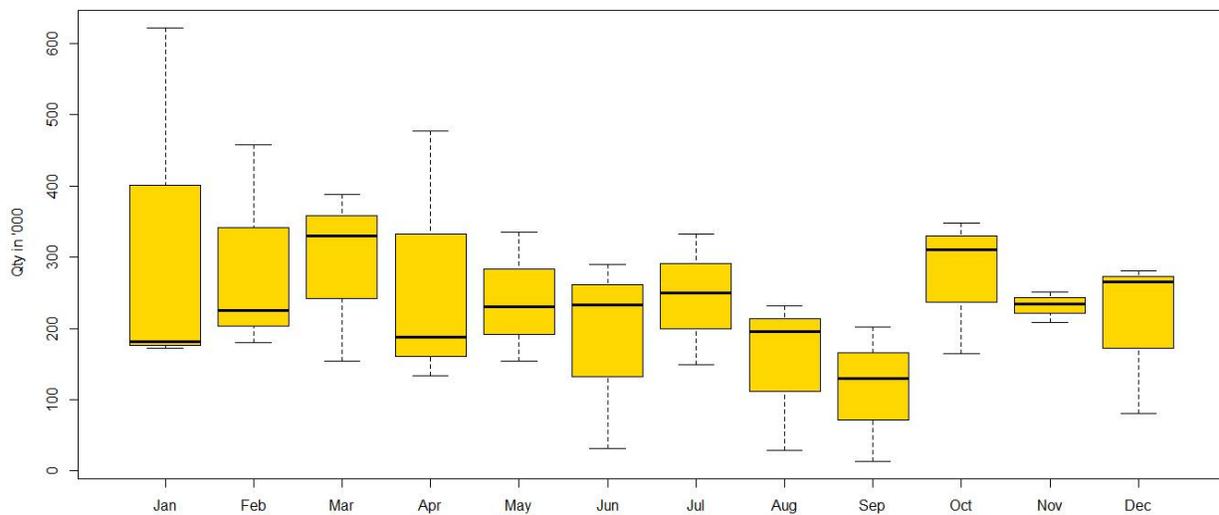


Figure 3. Seasonal distribution of the time series object.

From the boxplot, we can assume that seasonality has something to do with the Philippines’ non-metallics production peaks. For March-May, which is considered summer and dry season in the Philippines, production on the minerals is high compared to the rainy season (June-September) every year.

On average, the produced quantities of non-metallic minerals in Region XII from the Year 2017-2019 is 234,910 cu.m. The lowest produced quantity is 13,670 cu.m. and the maximum produced quantity is 621,760 cu.m.

Method	MAE	RMSE	MAPE	Theil's U-Statistics
Average	55.250	76.058	24.485	0.595

Naïve	54.754	75.848	24.348	0.593
Seasonal Naïve	50.498	55.130	23.155	0.306
Univariate Regression Analysis (Production Quantity~Trend)	146.479	164.672	75.921	0.800
Multivariate Regression Analysis (Production Quantity~ Trend + Seasonality)	104.766	115.693	51.367	0.568
ARIMA Model -ARIMA(0,1,0)	54.123	72.754	23.430	0.600
Artificial Neural Network - NNAR(1,1,2)	115.776	143.193	63.240	0.718

Table 2. Results of different forecasting methods applied to the testing data set.

The result revealed that the forecasting performance of the Seasonal Naïve Algorithm is best in our experiments for the non-metallics production quantity dataset. The benchmark methods work well in this short time series consisting only of 30 training lagged inputs and tested on unseen data. Out of 7 different forecasting algorithms tested for the non-metallics production quantity in Region XII, Philippines, seasonal naïve outperformed all other methods when it comes to the given performance indicators, i.e., seasonal naïve showed the best forecast accuracy in terms of the different evaluation measures.

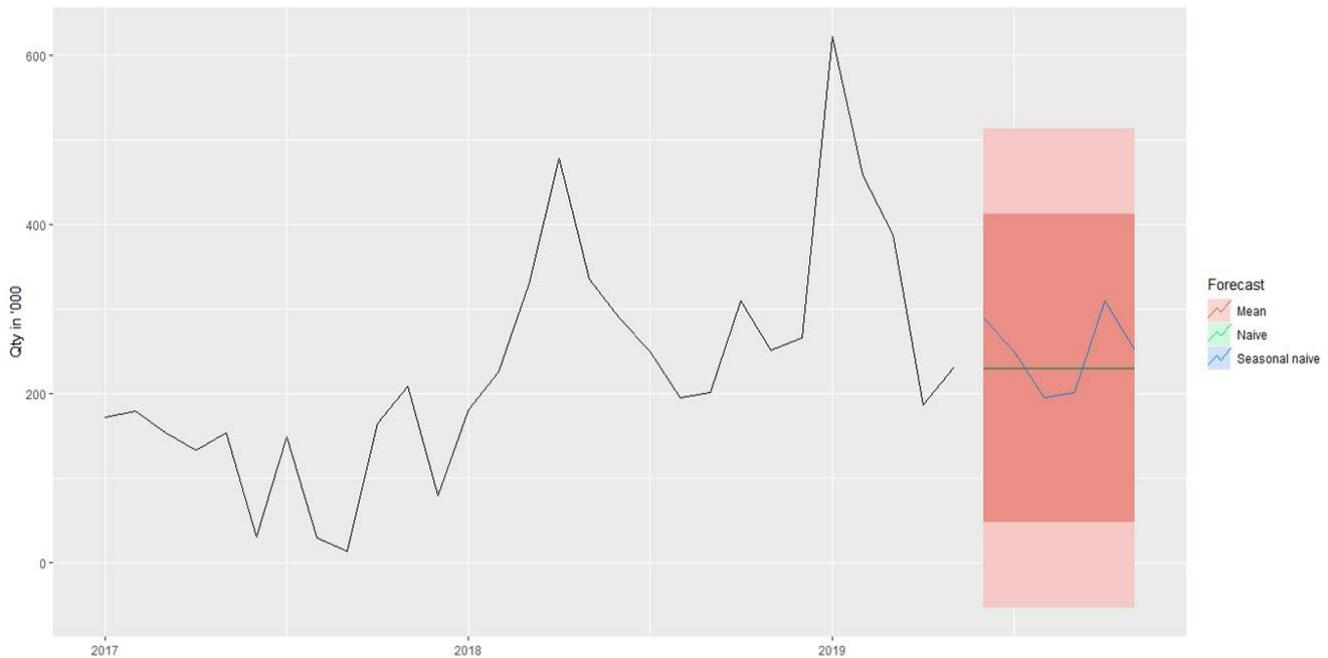


Figure 4. Comparative forecasting outcomes of benchmark models. It is apparent that mean and naïve methods performed poorly compared to seasonal naïve.

3.2 Regression Analysis

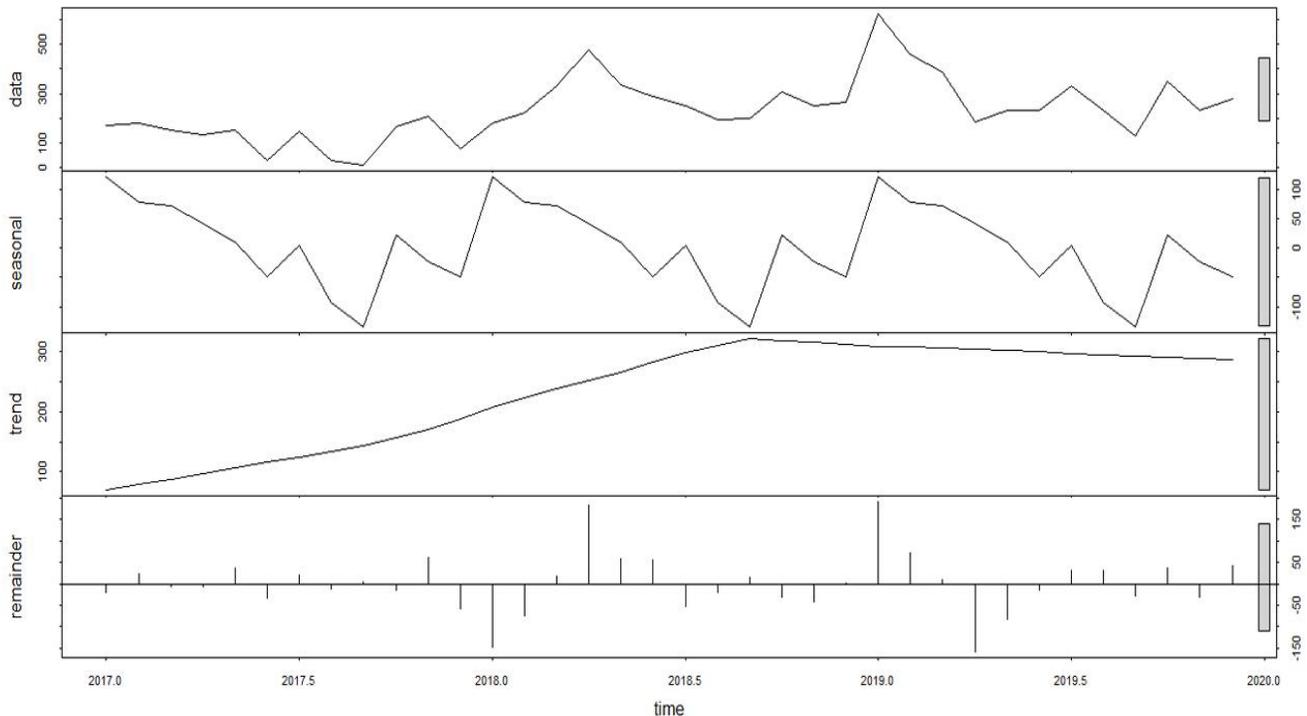


Figure 5. Seasonal and trend decomposition using Loess (STL Decomposition).

We get a good sense of how the time series behaves from the graph above. The figure is a decomposition tool that separates trend, seasonality, and random noise individually. Regression Analysis is then used to see if seasonality and trend truly affect production quantity. From this chart, we can see that seasonality is strong from 2018 to 2019.

```
Call
tslm(formula = sr ~ trend)

Residuals:
    Min       1Q   Median       3Q      Max
-167.597  -82.738    5.482   42.413  295.782

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)   85.700     42.204   2.031 0.052249 .
trend          9.611      2.457   3.911 0.000559 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 110.7 on 27 degrees of freedom
Multiple R-squared:  0.3617,    Adjusted R-squared:  0.3381
F-statistic: 15.3 on 1 and 27 DF, p-value: 0.0005591
```

Table 3. Fit statistics for univariate linear regression model via R Statistical Software (trend in the time series object affects the production quantity).

Linear regression did a good job of picking up the trend, that is, the explanatory factor is significant. The estimated model is defined as

$$\hat{y} = b_1X_1 = 9.611trend.$$

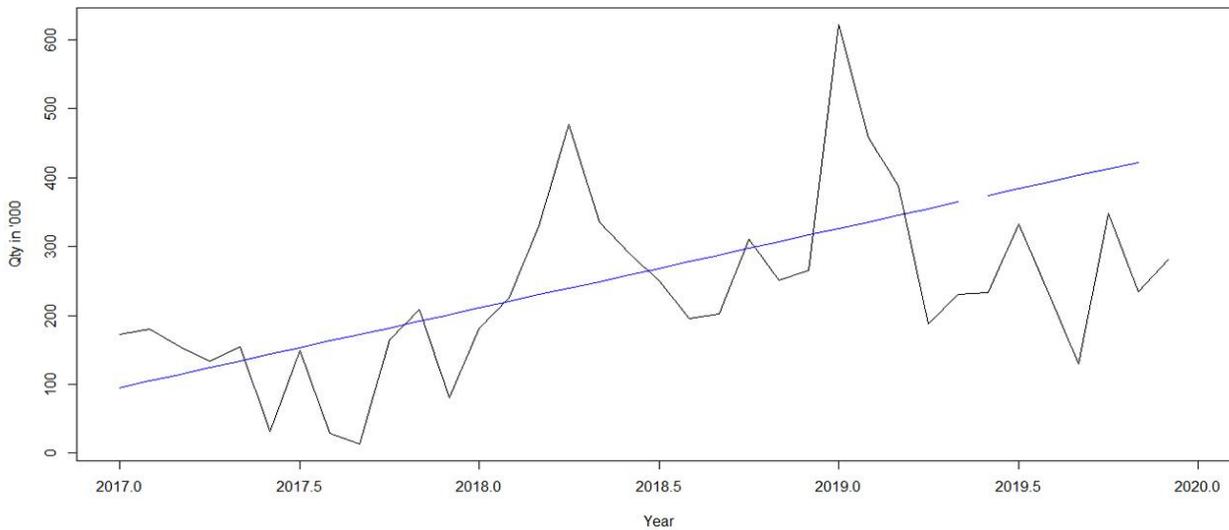


Figure 6. Scatterplot between fitted and actual values on predicting outcomes via simple linear regression analysis.

However, we will also test the significance of seasonality in the time series.

```
Call:
tslm(formula = sr ~ trend + season)

Residuals:
    Min       1Q   Median       3Q      Max
-200.10  -32.32  -10.24   35.26  211.58

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  193.513     71.005   2.725 0.014973 *
trend         10.102      2.484   4.067 0.000897 ***
season2      -47.036     89.464  -0.526 0.606272
season3     -54.858     89.567  -0.612 0.548831
season4     -89.062     89.739  -0.992 0.335751
season5    -125.503     89.980  -1.395 0.182142
season6    -154.591    100.016  -1.546 0.141733
season7    -125.028     99.985  -1.250 0.229109
season8    -222.876    100.016  -2.228 0.040545 *
season9    -237.459    100.108  -2.372 0.030572 *
season10   -117.759    100.262  -1.175 0.257377
season11   -135.237    100.477  -1.346 0.197081
season12   -202.499    100.753  -2.010 0.061621 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 109.5 on 16 degrees of freedom
```

Multiple R-squared: 0.6298, Adjusted R-squared: 0.3521
F-statistic: 2.268 on 12 and 16 DF, p-value: 0.06376

Table 4. Fit statistics for multivariate regression model via R Statistical Software (trend and seasonality affect the production quantity).

It did get a better R^2 at 0.6298 compared to the univariate model but adding seasonality just worsened the model. All the seasons are not significant and thus should not be added to the model. However, when it comes to predicting future values, the multivariate model is better at forecasting. It gave a better forecast accuracy compared to the univariate model as shown below.

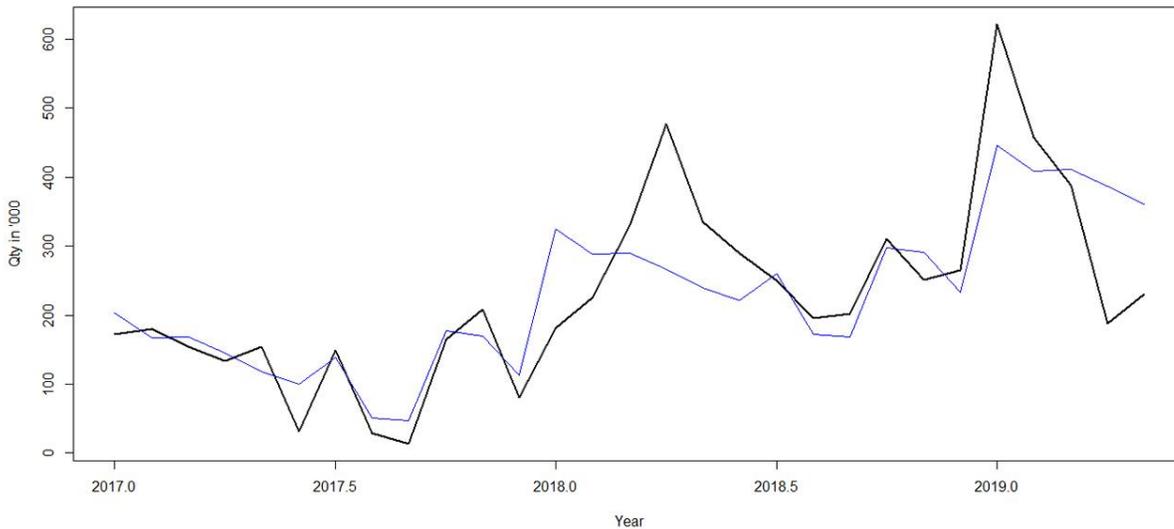


Figure 7. Results of observed and actual values fitted via multivariate regression analysis.

3.3 ARIMA Modeling

The forecast package in R has an *auto.arima()* function that finds the optimal and estimated ARIMA model that chooses the least AIC score.

```
ARIMA(0,1,0)
Series: sr

ARIMA(0,1,0)

sigma^2 estimated as 13379: log likelihood=-
172.75
AIC=347.5   AICC=347.66   BIC=348.83
```

Table 5. Result of auto.arima via R Statistical Software.

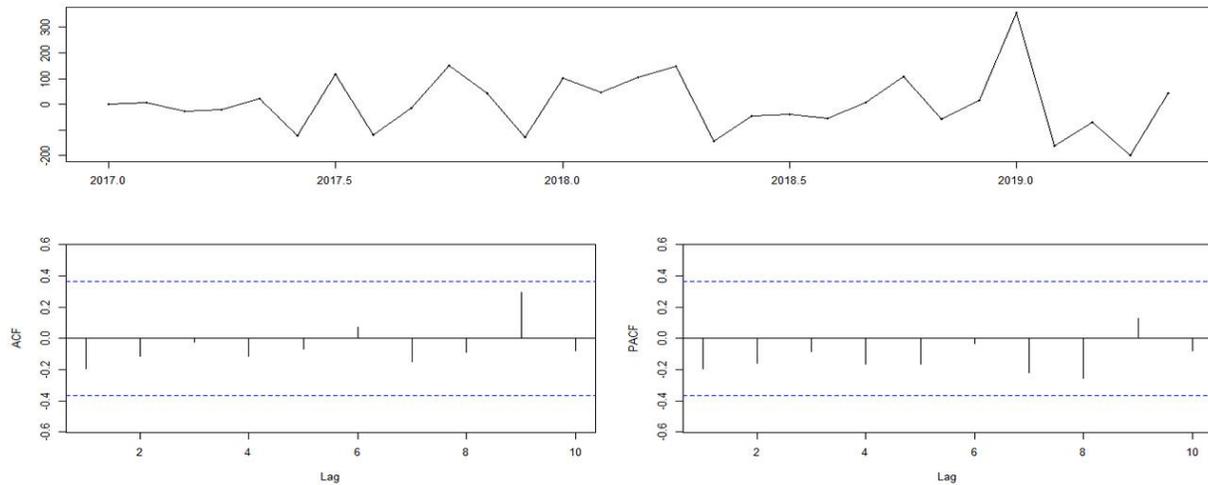


Figure 8. ACF and PACF plots of the time series model.

ARIMA(0,1,0) has been chosen as the optimal model configuration for the time series. Thus, the time series does not contain the AR component, i.e., it showed a very slight dependence as seen in the auto-correlation and partial auto-correlation plots above. It also does not contain the moving average. It only contains the I-component, meaning the best model has stationarity in it as expected from the time series plot.

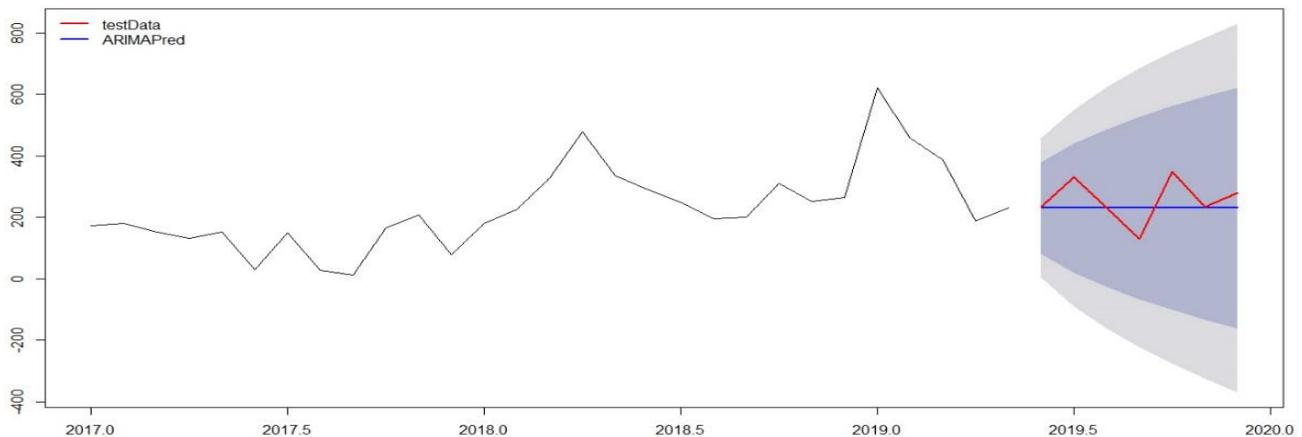


Figure 9. ARIMA modeling prediction plot.

3.4 Artificial Neural Network (ANN) Autoregression

Model: NNAR(1,1,2) [12]

Average of 20 networks, each of which is a 2-2-1 network with 9 weights
 options were - linear output units

sigma² estimated as 6497

Table 6. NNAR results via R statistical software.

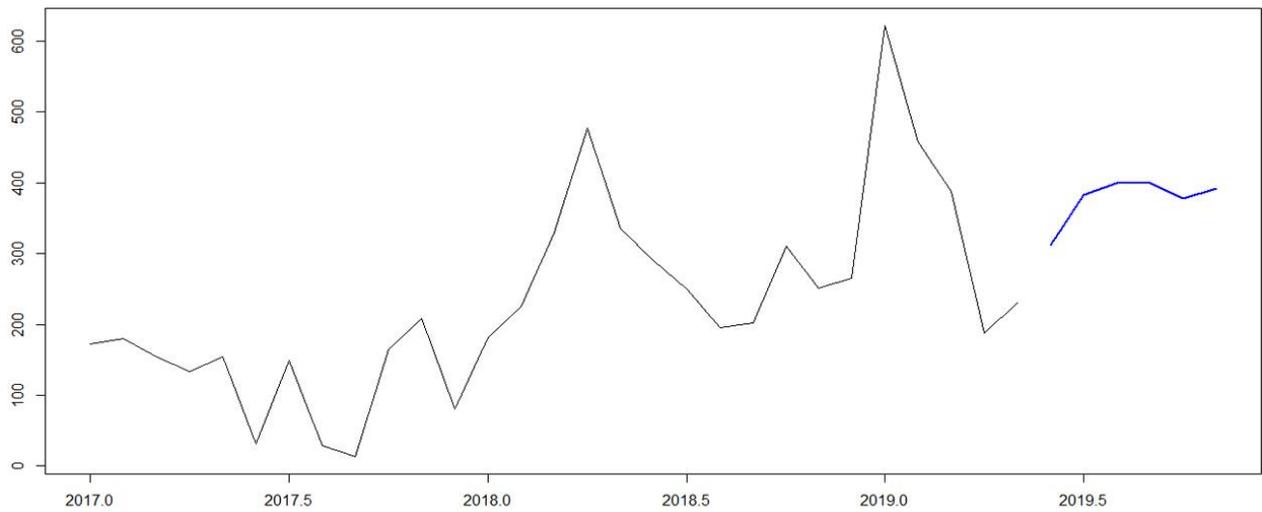


Figure 10. NNAR model prediction plot.

The model selection for the NNAR model is chosen via the lowest AIC. Thus, the NNAR(1,1,2) is chosen as the optimal model for this time series, that is, 1 lagged input is used as a predictor, and 1 hidden layer containing 2 neurons are used.

IV. CONCLUSION

The results indicate that different time series models can improve production forecast outcomes. Hence, out of all the models tested such as the average method, naïve method, seasonal naïve method, simple linear regression analysis, multiple regression analysis, ARIMA modeling, and Artificial Neural Network, the seasonal naïve method outperformed all other models used for this paper.

The outcome of this research can be used as a benchmark paper in employing more exogenous variables that can account for the non-metallics production quantity in Region XII. Furthermore, this study can be easily replicated by other researchers. But since this study was retrospective, it imposed no controls over the data and the data itself is representative of the actual operations.

This study is important because it provides an opportunity to create better policy frameworks that lead to larger revenues that help sustain projects of the government.

Appendixes, if needed, appear before the acknowledgment.

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Characteristics of Dental Treatment in two months' Quarantine due to Coronavirus Disease (COVID-19)

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Abstract- Introduction: Novel coronavirus disease was announced on January 30, 2020, by the World Health Organization (WHO). On March 13, 2020 many dental offices closed due to the impending danger. Patients were discharged from the schedules without a clear idea of when normal dental activity would resume. Under such circumstances, a lot of patients with pain, caries or fracture restoration had to wait for dental care during these two months. The **aim** of the current study is to analyze the character of the dental complains and treatment immediately after 2 months of quarantine due to COVID-19; and to consider proposals and strategies for infection control in the new situation. **Materials and methods:** The study included patients who visited general dental practice in the period of May 14 - June 14, 2020. Patient information about gender, age and diagnosis were analyzed. The obtained body temperatures and the questionnaires for the epidemiological study of COVID-19 were reviewed. The data are compared with those for the same period - May 14 - June 14, 2019. The results of the conducted study are presented graphically and represent the percentage distribution of gender, age and diagnosis. **Results:** For both periods of time the percentage of female who visited dental practice is higher - 53% for 2020 and 57% for 2019, than male percentage - 47% for 2020 and 43% for 2019, respectively. The highest percentage (47%) of patients who visited the dental practice in two months' quarantine were aged 41-50, compared to the year of 2019 when the highest percentage (31%) of patients were aged 61-70 and 24% - 51-60. The highest percentage (41%) of patients in two months' quarantine in the year of 2020 were with fracture of restoration or tooth fracture and 20% turned out to be with irreversible pulpitis. Within the same period of time in 2019, treatment of apical periodontitis - 39% and restorations/caries treatment - 33% were most prevalent.

Prosthetic reasons for the study period of one month in 2020 were 15%, while for 2019 - 6%. Periodontal reasons -18% cases were registered for 2020, and 9% - for 2019. Conclusions: In two months' quarantine the patients look for dental care only in case of pain (irreversible pulpitis, symptomatic periodontitis) or tooth/restoration/crown fracture. In pandemic situation during COVID-19 outbreak, personal protective equipment and patient screening are considered to be of great importance in protecting dental staff and patients.

Index Terms- coronavirus disease, dental treatment, protective equipment

I. INTRODUCTION

Novel coronavirus disease was announced on January 30, 2020, by the World Health Organization (WHO). WHO declares danger to public health of international importance following global spread of infection complicated by (Corona Virus Disease, COVID-19) [1, 2].

The new 2019-nCoV, which started in Wuhan, Hubei Province in China, belongs to the β - coronaviruses. This virus mainly affects the respiratory, digestive and central nervous systems of humans [3].

The main routes of transmission include via respiratory droplets (sneezing, coughing, talking and aerosols) and contact transmission (contact with the oral, nasal and ocular mucosa) [4, 5]. Transmission of the virus can also occur through direct contact with asymptomatic patients. The asymptomatic incubation period for SARS-CoV-2 infected patients is within 2 - 14 days.

The clinical symptoms of patients are as follows: fever, dry cough, sore throat, fatigue, muscle pain, severe exhaustion. Less typical symptoms involve headache, sputum, diarrhea and vomiting [3, 6].

In dental practices, staff is at extremely high risk of SARS-CoV-2 infection due to direct contact with saliva, blood, aerosols when working with high-speed handpieces and ultrasound devices [1, 3, 4, 7]. Pathogenic microorganisms can be transmitted in the dental office by inhaling airborne microorganisms and viral particles that can remain dispersed for a long period of time. These drops fall quickly on the floor, surrounding work surfaces, medical staff or patient. SARS-CoV-2 can persist over the surfaces for a few hours up to several days depending on temperature and humidity [1, 8]. The transmission path is also the indirect contact with contaminated instruments or surfaces from the environment. Effective infection control strategies are needed to prevent the spread of COVID-19 by contact.

On March 13, 2020 many dental offices closed due to the impending danger. Patients were discharged from the schedules without a clear idea of when normal dental activity would resume. There was neither enough personal protective equipment nor disinfectants. A lot of patients with pain, caries or fracture restoration had to wait for dental care over this two months' period.

After two months (from 13 March to 14 May) emergency epidemiological situation was introduced - from 14 May, 2020 until June 14, 2020 - during which the measures were gradually relaxed and society moved to a more normal life [9]. Throughout

this period, the admission of patients with strict selection and observance of strict anti-epidemic measures began slowly.

The aim of the current study is to analyze the character of the dental complains and treatment immediately after 2 months of quarantine due to COVID-19 and to consider proposals and strategies for infection control in the new situation.

II. MATERIALS AND METHODS

The study included patients who visited general dental practice in the period of May 14 - June 14, 2020. Patients admitted to the waiting room wear a surgical mask. The schedule is designed so that there is only one patient in the waiting room. When entering the office, patients disinfect their hands. The body temperature of each patient is taken with a DT8018 non-contact thermometer. Patients who have shown normal body temperature complete a screening questionnaire for potential patients with SARS-CoV-2. The following four questions are included:

- Have you had a fever for the last 14 days? Have you had eye inflammation, dry cough, difficulty breathing or other flu-like complaints?
- Have you travelled outside the borders of the Republic of Bulgaria for the last 14 days?
- Have you been in contact with people coming from risk areas for the last 14 days?
- Have you been in contact with people with confirmed SARS-CoV-2 infection for the last 14 days?

Diagnoses were based on patient complains and clinical investigations. The main diagnoses were – Irreversible pulpitis,

Fracture of restoration or tooth fracture, Symptomatic periodontitis, Prosthetic reasons and Periodontal reasons.

Gender and age were analyzed. The obtained body temperatures and the questionnaires for the epidemiological study of COVID-19 were reviewed. In patients given "no - answer" to all questions and having a temperature below 37° C, the appropriate treatment was carried out using additional protective equipment and maximum restriction of procedures that lead to aerosol spraying. Before the procedure the patients rinsed mouth with Perio Aid (0.05% chlorhexidine and 0.05% cetylpyridinium chloride). Rubber dam was used during the procedure.

The data are compared with those for the same period May 14 - June 14, 2019.

Statistical analysis: The results of the study are presented graphically and indicate the percentage distribution of the gender, age and diagnosis.

III. RESULTS

The results are presented in a comparative manner depending on gender, age and diagnosis for the period - 14 May to 14 June 2020 (13 working days) and 14 May to 14 June 2019 (19 working days).

For both periods of time the percentage of female who visited dental practice is higher - 53% for 2020 and 57% for 2019 compared to male percentage – 47% for 2020 and 43% for 2019 (Fig.1).

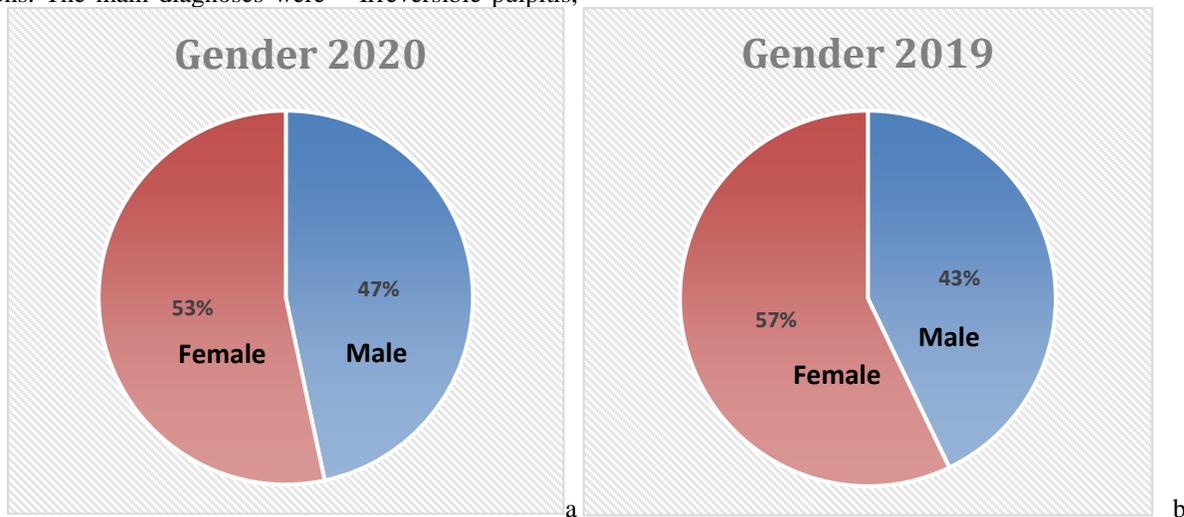


Figure 1: Distribution of patients by gender: a) 2020 b) 2019

The highest percentage (47%) of patients who visited the dental practice in two months' quarantine were aged 41-50, compared to the year of 2019 when the highest percentage (31%) of patients were aged 61-70 and 24% - 51-60 (Fig.2).

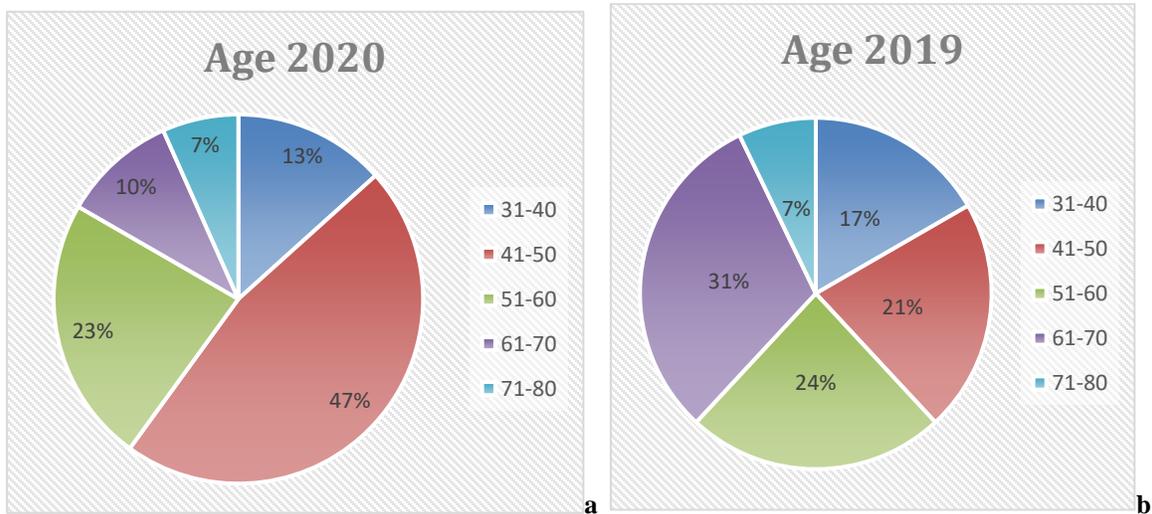
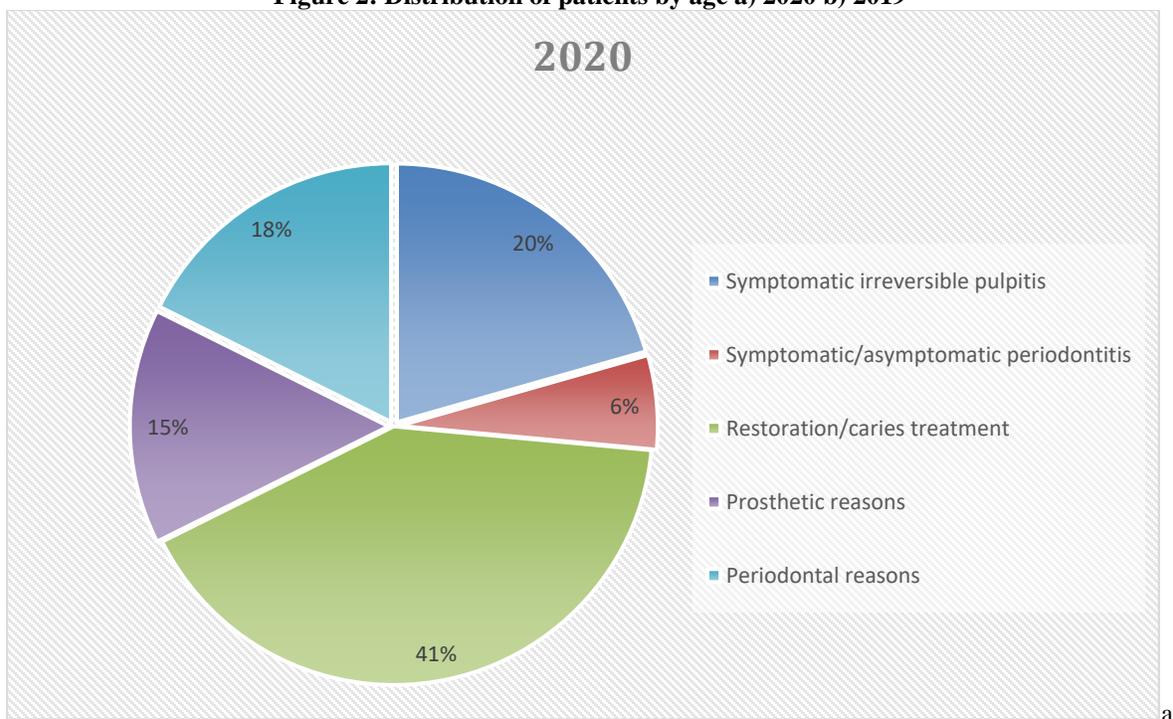


Figure 2: Distribution of patients by age a) 2020 b) 2019



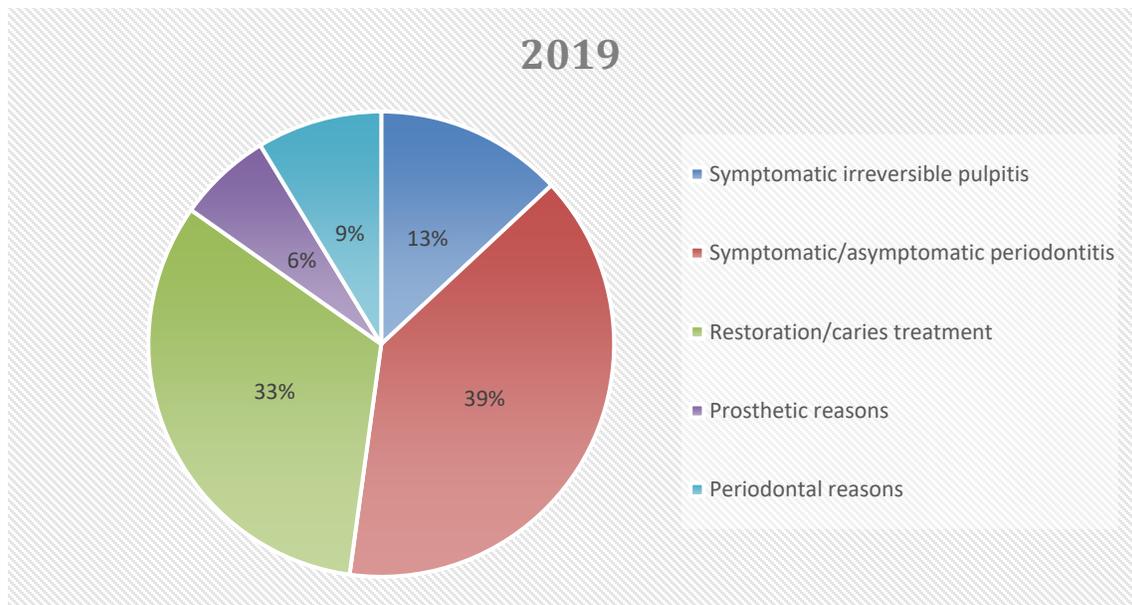


Figure 3: Percentage distribution of diagnosis for period a) 14 May to 14 June 2020; b) 14 May to 14 June 2019

The highest percentage (41%) of patients in two months' quarantine in the year of 2020 were with fracture of restoration or tooth fracture and 20% turned out to be with irreversible pulpitis. Within the same period of time in 2019, treatment of apical periodontitis - 39% and restorations/caries treatment - 33% were most prevalent.

Prosthetic reasons for the study period of one month in 2020 were 15%, while for 2019 – 6%. Periodontal reasons -18% cases were registered for 2020 and 9% - for 2019 (Fig.3).

IV. DISCUSSION

The diagnosis of COVID-19 is a combination of epidemiological information, clinical symptoms and laboratory tests (PCR). The incubation period is between 2 and 14 days and during this period patients can infect other people.

Fever is one of the leading symptoms of coronavirus infection (98%) [10, 11]. No patients with fever were identified in the present study. No patients were found to have answered “yes” to any of the questions. Of all the patients, examined and undergone treatment within the period of 14 May - 14 June, no case of SARS - CoV -2 infection was identified. At the end of dental treatment for that period 12 patients have made a PCR test voluntarily and all of them were negative.

Hand hygiene is another important factor for reducing the risk of transmission of SARS-CoV-2. All patients disinfect their hands using an alcohol based sanitizer when entering the office. Dentists should wash their hands before examining a patient, before handling and after touching surrounding surfaces that have not been disinfected. Besides, dentists ought to be careful and avoid touching their own eyes, nose and mouth [1].

Rinsing with antibacterial mouthwash at the beginning of dental procedures reduces significantly microbial load. A study used meta-analysis of 12 studies showed that pre-procedural mouth rinses with chlorhexidine, cetylpyridinium chloride and essential oils (eucalyptol, menthol, thymol, lemon oil, tea tree oil) reduced considerably the number of microorganisms in the dental aerosol [12, 13]. Dental aerosols may contain particles from saliva,

blood, tooth debris, dental plaque or dental filling materials, and generated from the high-speed hand piece, ultrasonic devices or water/air spray. Such particles have a diameter of 50 µm or less [8].

In two months' quarantine and prolong waiting for dental treatment to initiate, fracture of restoration or tooth fracture (41%) and irreversible pulpitis – 20% turned out to be most frequent patient complaints. In three of cases with fixed appointment for caries treatment before March 13, the patient diagnosis was complicated into pulpitis due to delayed untimely visit. Over that period patients reported of higher level of anxiety concerning their teeth and impossibility to do anything for them. Yu J. et al. observed emergency treatment from 22 February to 2 March, 2020 in emergency department of the School and Hospital of Stomatology at Wuhan University. They found out that the most common emergency cases (50.26%) were with symptomatic irreversible pulpitis compared to the year of 2019, when emergency cases were 13.47% [10]. Guo et al. reported for less dental trauma during period of isolation [14].

Coronavirus disease has a high spreading potential. People of all ages are susceptible to this coronavirus infection [1]. Elderly patients with chronic diseases have a higher risk of infection than young patients with strong immune system [13]. The highest percentage (47%) of patients who visited dental practice in a two-month quarantine are aged 41-50, compared to the year of 2019 when the highest percentage (31%) of patients having used dental service were aged 61-70 and 24% - 51-60. Elderly patients (over aged 60) are afraid to visit a dental practitioner for longer procedures especially in case of delay.

During COVID-19 pandemic, dentists are at high risk of infection. Reducing treatment time and exposure control are two ways to diminish the risk of infection [10]. Routine dental procedures have been delayed, completely depending on epidemic situation. For 2019, 39% of clinical cases were with asymptomatic apical periodontitis compared to 2020 when predominant cases were with fracture of restoration or tooth fracture (41%). In pandemic situation patients look for dental care only in case of

pain. They tend to wait for treatment which can be delayed. Regarding periodontal cases (18%) in our study for the year of 2020 - hand scalers were used, while in 2019 (9%) -ultrasonic scalers were applied.

In an emergency epidemiological situation, a number of precautions should be taken by dentists. Being equipped with disposable N95 masks, gloves, eyeglasses, face shields, caps and gowns is a must. In dental office - UV lamps for disinfection and air purifier need to be available [10].

At the end of dental treatment for the period of our study (14 May - 14 June 2020), 12 patients have made a PCR test voluntarily and all of them were negative. This outcome undoubtedly suggests that the protective measures were effective in protecting patients during COVID-19 infection. None of the other patients had complaints of health deterioration.

V. CONCLUSIONS

In two months' quarantine the patients look for dental care only in case of pain (irreversible pulpitis, symptomatic periodontitis) or tooth/restoration/crown fracture. In pandemic situation during COVID-19 outbreak, personal protective equipment and patient screening are determined to be of great importance in protecting both patients and dental staff.

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Corporate Governance And Financial Reporting Quality In Nigeria Deposit Money Banks

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Abstract- The manipulations of financial statements and subsequent corporate failure are recurring phenomena globally which have not guaranteed the credibility of the financial statements. Studies have shown that financial statement quality is a challenge in deposit money banks in Nigeria. Despite various measures put in place by the regulatory agencies, there were recurring cases of poor quality of financial statements. Therefore, the study examined the effect of corporate governance on financial reporting quality in quoted deposit money banks in Lagos State, Nigeria.

The study adopted survey and *ex post facto* research design. The target population for this study was staff from 10 deposit money banks in Lagos State, Nigeria and 450 participants were purposively sampled for the study. The instrument for the study was validated by the supervisor and its reliability test shows 0.752. The data for the study was analysed using multiple regression analysis.

The study showed that corporate governance has significant effect on financial reporting quality in selected deposit money banks in Lagos State, Nigeria. The finding also revealed that shareholders assembly, board of directors, supervision and control; and transparency and publicity have significant effect on faithful representation $Adj R^2 = 0.596$; F-Stat "F (4, 432) = 161.994" and $p-value=0.000$; on the relevance with $Adj R^2 = 0.899$; F-Stat "F (4, 432) = 968.894" and $p-value = 0.000$. Also on financial report comparability with $Adj R^2 = 0.606$; F-Stat "F (4, 432) = 168.993" and $p-value = 0.000$; and on timely preparation with $Adj R^2 = 0.805$; F-Stat "F (4, 432) = 74.307" and $p-value = 0.000$ of the selected banks in this study.

The study concludes that corporate governance is essential towards the growth of deposit money banks in Nigeria. It was recommended that the government should ensure the provision of standards and guidelines to regulate forensic activities and above all Nigerians should embrace integrity, objectivity, fairness and accountability in their day-to-day activities.

Index Terms- Comparability, Corporate governance, Faithful representation, Financial reporting quality, Relevance, Timeliness.

I. INTRODUCTION

Financial reporting quality has gained increasing attention globally in recent decades, being pervasive in almost all spheres of the human activity (Kim, 2019). This study shows that

financial reporting quality from a global perspective is dependent in terms of the nature of governance principle in all countries both the developed and developing countries (Ismael & Roberts, 2018). Discussion on financial reporting quality in the UK, the US, German and Japan there are sector aims of understanding the performance of the governance systems of different countries from the international scene irrespective of the attempts made in these countries to reform the practice of corporate governance. Financial reporting quality is an idea of outcome, achievement of goals and quality in terms of efficiency and effectiveness of an organization's production and services (Onaolapo & Ajala, 2018). In Africa, a measure of an organizations financial reporting quality can be viewed from financial and organizational perspectives (Onuonga, 2014). Financial reporting quality is in terms of profit maximization, maximizing return on assets and maximizing shareholder return which is built on the company's efficiency (Tudose, 2018). However, valuation of financial reporting quality in many countries in Africa bends to using financial indicators to accompany by a valuation founded on organizational perspective - productivity, returns, growth or even customer satisfaction (Roussy & Brivot, 2016). Good financial reporting quality translates into good financial performance and if corporate organizations fail to increase governance by ensuring efficient use of capital structure decision, domestically, performance in all ramifications will become less effective (Sheedy & Lubojanski, 2018).

For banks to be able to function effectively and contribute meaningfully to the development of a country, the industry must be stable, safe and sound. In addition, due to fraud and poor financial reporting in the banking system of Nigeria, the results of the stress tests conducted by the CBN in 2009 on deposit money banks revealed that eight of the 24 banks in the country were unhealthy, necessitating the intervention of the CBN through the injection of 620 billion naira of liquidity into the banking sector (Ongore & Kusa, 2013). Financial reporting quality of an organization defines the extent to which the organizational system promotes the achievement of its corporate goals and objectives (Onuonga, 2014). In the case of profit-based organizations like deposit money banks, these objectives and goals are related to financial and non-financial governance (Gamage, Lock & Fernando, 2014).

However, a system of financial reporting quality is a critical component of an organization's management and a foundation for its safe and sound operations. A system of strong financial reporting quality can help to achieve the goals and objectives of

banks, for long-term targets and maintain reliable financial, managerial reporting quality (Anthony, 2018), Such a system can also help to ensure that the banks will comply with laws and regulations as well as policies, plans, internal rules and procedures, and reduce the risk of unexpected losses and damage to the organization's reputation (Hunziker, 2016).

Despite the importance of this sector in regulating the economy the quality, and standard of financial reporting in the Nigerian banking sector seems not to match the high standard of reporting in the banking sector of more developed countries (Thomasa & Kumara, 2016). In this regard, this study examine the effects of corporate governance on financial reporting quality in Nigeria deposit money banks.

The specific objectives are to;

- i. evaluate the effect of shareholders assembly, board of directors, supervision and control, transparency and publicity on the faithful representation of financial report of Nigeria deposit money banks;
- ii. ascertain the effect of shareholders assembly, board of directors, supervision and control, transparency and publicity on the relevance of financial report of Nigeria deposit money banks;
- iii. assess the effect of shareholders assembly, board of directors, supervision and control, transparency and publicity on financial report comparability of Nigeria deposit money banks;
- iv. examine the effect of Board independence, board size, ownership structure, board diversity and audit committee on the timely preparation of financial report of Nigeria deposit money banks.

Research Hypotheses

H₀₁: Shareholders assembly, board of directors, supervision and control, transparency and publicity have no significant effect on the faithful representation of financial report of Nigeria deposit money banks.

H₀₂: Shareholders assembly, board of directors, supervision and control, transparency and publicity have no significant effect on the relevance of financial report of Nigeria deposit money banks.

H₀₃: Shareholders assembly, board of directors, supervision and control, transparency and publicity have no significant effect on financial report comparability of Nigeria deposit money banks.

H₀₄: Board independence, board size, ownership structure, board diversity and audit committee have no significant effect on timely preparation of financial report of Nigeria deposit money banks.

II. LITERATURE REVIEW

Financial Reporting Quality

The concept of quality financial reporting has commanded considerable research interest around the world. Financial reporting quality address matters of increasing concern to investors in order to enhance public trust in business. Organization are expected to improve quality report for forward-looking information, the potential impact of emerging risks on future business strategy (i.e. the risks to which companies are exposed

and the actions they take to mitigate the impact of uncertainties, the carrying value of assets and the recognition of liabilities as failure to report on these crucial areas undermines trust in business and can lead to the conclusion that management can either be unaware of their potential impact, being opaque, or is not managing them effectively). Financial reporting quality owns the following features; faithful representation, relevance, comparability, and timely in preparation.

Faithful Representation

For financial information to be useful, it must not only represent relevant phenomena, but also faithfully represent the phenomena that it purports to represent. Faithful representation is achieved by presenting the transactions and events in the way they are reasonably expected to be reported in the financial statements and is usually measured in terms of neutrality, completeness, freedom from material error. Faithful and representation does not mean accurate in all respects. It means the process used to produce. The study established that the size of a board negatively affect the faithful representation of the firms. In addition, the study established a positive relationship between board composition and faithful representation. The study further provided evidence that the segregation of the CEO and Chairman's roles positively influenced the faithful representation of the listed insurance companies.

Relevance

Relevant financial information is capable of making a difference in the decisions made by users. Information may be capable of making a difference in a decision even if some users choose not to take advantage of it or are already aware of it from other sources. Financial information can make a difference in decisions if it has predictive value, confirmatory value or both. Financial information has predictive value if it can be used as an input to processes employed by users to predict future outcomes. Financial information has confirmatory value if it provides feedback about previous evaluations.

Comparability

Comparability is a desirable property of financial reporting and is defined as the quality of accounting information that enables users to identify and understand similarities in, and differences across, firms (FASB, 2018). Investors choose among alternatives in making investment decisions. Therefore, "information about a reporting entity is more useful if it can be compared with similar information about other entities and with similar information about the same entity for another period or another date" (FASB, 2018).

Timely Preparation

Timeliness means having information available to decision-makers in time to be capable of influencing their decisions. Generally, the older the information, the less useful it is. However, some information may continue to be timely long after the end of a reporting period because, for example, some users may need to identify and assess trends. Timeliness illustrates that information must be available to decision makers before losing its powerful and good influences.

Corporate Governance

Corporate governance is a uniquely complex and multi-faceted subject (Ene & Bello, 2016). Corporate governance is a technique created and put in place to stop entrepreneurs and owners acting abusively or even criminally on behalf of a company. Corporate Governance is aimed at ensuring proper governance of business as well as complying with all the governance norms prescribed by regulatory body for the benefit of all interested parties including society (Fekadu, 2015). Corporate governance is about building credibility, ensuring transparency and accountability as well as maintaining an effective channel of information disclosure that would foster good corporate performance (Paul & Yakubu, 2015).

Shareholders Assembly

The kind of affiliation between the managerial ownership structure and corporate governance structure has been a major issue in corporate governance literatures. The major reason behind giving directors and managers equity stake in firms is to resolve the problem of moral hazard which is a core agency problem which aims at aligning managerial interests with of shareholders. Shareholders assembly is the individuals that shareholders rely on to ensure that their investment is protected and well managed.

Board of Directors

Board of directors is the number of executive and non-executive directors sitting on the board of a company. Gone are the days when a new director's main skill was being in the right circles and would simply fit with the existing Board and culture. The new world we live in brought about by digital technology, more open markets and increased competition has accelerated the need for change.

Supervision and Control

Directors are motivated to run and manage the business well and generate profit as their wealth are tied to the well-being of the company. They are the main organizers of the company and they have the greatest risks in the success and failures of the business. They have better knowledge of the firm better than any stakeholder. Directors are effective monitors of firm's strategy related issues.

Transparency and Publicity

It is about building credibility, ensuring transparency and accountability as well as maintaining an effective channel of information disclosure that would foster good corporate performance. There is no generally accepted definition for corporate governance as there are different opinions to it in different regions all over the world.

Board Independence

This finding suggested that keep tracking of corporate boards by independent directors will assist them to become more reactive to investors and will enhance the company's adherence with the disclosure requirements, which consecutively will improve the extent and quality of information disclosures.

Board Size

Board Size refers to the number of directors sitting on a board at a particular company. There is a notion that board size affects corporate governance in most studies. The board of directors is responsible for ensuring the reliability of financial statements. Limiting board size to a particular level is widely believed to improve the performance of the firm at all levels.

Ownership Structure

Ownership structure refers to ratio of shares held by directors on the board. Board's ownership is an encouragement for board members. This encouragement will help board members supervise management in a more efficient way. With this position it is safe to say that, board's ownership will improve firm's performance. Ownership structure was not investigated extensively in prior research. Only few researches considered the association between ownership structure and FRQ.

Board Diversity

Board diversity refers to the diversity of skills and experience available to the company among the board of directors. These are the skills that are available and aligned with the strategy of the company which provides effective corporate governance and oversight. The company so strive to attain a balance between directors with experience and knowledge of the organisation and directors with specialist expertise with a fresh perspective by building a skills-based board.

Audit Committee

Audit committee refers to the total number of members in the audit committee in a company. High-profile corporate scams have heightened the need for an effective audit committee. Frequent CEO duality, audit committee, meetings and independence of audit committee can ensure credibility of corporate reports. Audit committee is one of the board committees set up to aid the effectiveness of the board. An effective audit committee is a vital component of an effective corporate governance system.

2.2 Theoretical Review

Agency Theory

The theory of principal-agent problem occurs when one person or entity i.e. the agent is able to make decisions on behalf of another person or entity i.e. the principal. Agency theory was propounded by Stephen Ross and Barry Mitnick in 1970. The literature on corporate governance attributes two factors to agency theory. The first factor is that corporations are reduced to two participants, managers and shareholders whose interests are assumed to be both clear and consistent. A second notion is that humans are self-interested and disinclined to sacrifice their personal interests for the interests of the others (Daily, Dalton, & Cannella, 2019).

This emphasizes the role of accounting in reducing the agency cost in an organization, effectively through written contracts tied to the accounting systems as a crucial component of corporate governance structures, because if a manager is rewarded for their performance such as accounting profits, they will attempt to increase profits which will lead to an increase in bonus or remuneration through the selection of a particular accounting method that will increase profits.

Stakeholder Theory

Stakeholder theory was propounded by Dr. F. Edward Freeman, a professor at the university of Virginia in 1984. This theory centers on the issues concerning the stakeholders in an institution. It stipulates that a corporate entity invariably seeks to provide a balance between the interests of its diverse stakeholders to ensure that each interest constituency receives some degree of satisfaction Abrams (2019). However, there is an argument that the theory is narrow because it identifies the shareholders as the only interest group of a corporate entity.

The traditional definition of a stakeholder is “any group or individual who can affect or is affected by the achievement of the organization’s objectives” Freeman (2019). With an original view of the firm, the shareholder is the only one recognized by business law in most countries because they are the owners of the companies. Given this, the firm has a fiduciary duty to maximize their returns and put their needs first. In more recent business models, the institution converts the inputs of investors, employees, and suppliers into forms that are saleable to customers hence return back to its shareholders.

Resource Dependency Theory

This theory was propounded by Jeffrey Pfeffer and Gerald Salancik in 1978. Resource-dependence theories argue that a board exists as a provider of resources to executives in order to help them achieve organizational goals (Hillman, Cannella and Paetzold, 2019; Hill and Jones, 2019). For example, board members who are professionals can use their expertise to train and mentor executives in a way that improves organizational performance.

The basic proposition of resource dependence theory is the need for environmental linkages between the firm and outside resources. In this perspective, directors serve to connect the firm with external factors by co-opting the resources needed to survive. Thus, boards of directors are an important mechanism for absorbing critical elements of environmental uncertainty into the firm.

Stewardship Theory

Stewardship theory propounded by Donaldson and Davis is about the employment relationship between two parties, the principal (owner) and the steward (manager). The fundamentals of the stewardship theory are based on social psychology, which focuses on the behaviour of executives. Therefore, stewardship theory is an argument put forward in firm performance that satisfies the requirements of the interested parties resulting in dynamic performance equilibrium for balanced governance.

Social Contract Theory

Among other theories reviewed in corporate governance literature is social contract theory, which sees society as a series of social contracts between members of society and the society itself (Gomper, Ishii & Metrick 2018). An integrated social contract theory was developed by Demsetz & Lehn (2019) as a way for managers make ethical decision making, which refers to macrosocial and microsocial contracts.

Legitimacy Theory

Another theory reviewed in the corporate governance literature is legitimacy theory. Friedman (1970) propounded this theory. Legitimacy theory is defined as a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate with some socially constructed systems of norms, values, beliefs and definitions Donli (2018). Similar to social contract theory, legitimacy theory is based upon the notion that there is a social contract between the society and an organization. A firm receives permission to operate from the society and is ultimately accountable to the society for how it operates and what it does because society provides corporations the authority to own and use natural resources and to hire employees Joh (2019).

Political Theory

Political theory propounded by George Holland Sabine, brings the approach of developing voting support from shareholders, instead of purchasing voting power. Hence, having political influence in corporate governance may direct corporate governance within the organization. Public interest is much reserved as the government participates in corporate decision making, taking into consideration cultural challenges Inam (2019). The political model highlights the allocation of corporate power, profits and privileges are determined via the governments’ favour. The political model of corporate governance can have an immense influence on governance developments.

Empirical Review

Financial reporting quality and Board independence

Aliyu and Ishaq (2015) studied the impact of monitoring characteristics on financial reporting quality of the Nigerian listed oil marketing firms. Financial reporting quality is represented by the qualitative characteristics of the financial statement. Data for the study were obtained from an audited annual report and accounts of the sampled oil marketing companies for twelve years covering 2000 to 2011.

Noor and Kamarul (2014) examined the relationship between board independence and accounting conservatism among Malaysian companies in the year 2000 until 2012. What triggers the researchers to carry out this study is that studies found that the implementation of Malaysian Code of Corporate Governance to Malaysian companies has created a higher confidence level to investors and enhances the company’s image. Further, one of the elements of good corporate governance is the board independence. It was argued that accounting conservatism is an effective mechanism to address the agency problem. Based on the findings, the study found that higher board independence does not align with higher conservatism. Instead, the independent non-executive directors do not actually have the power of independence, monitoring and advising the board.

Financial reporting quality and Board size

Aminu, Aisha and Muhammed (2015) analyzed the effects of board size and board composition on the performance of Nigerian banks. The financial statements of five banks were used as a sample for nine years and the data collected were analyzed using the multivariate regression analysis. The study found that board size has a significant negative impact on the performance of banks in Nigeria.

Financial reporting quality and Ownership Structure

Amer and Ravindran (2013) studied the relationship between corporate governance and ownership structure on voluntary disclosure, with a particular focus on variables affecting voluntary disclosure of listed companies in the Amman Stock Exchange (ASE).

Nwalomwa (2016) studied the impact of ownership structure on financial disclosure quality of 75 firms listed on the Nigerian Stock Exchange (NSE) during the period 2011-2015. The study modeled financial disclosure quality using both accounting measure (ACCR) and market-based measure (RET). The study used foreign ownership, managerial ownership, and institutional investors as ownership structure attributes. The data used for the study were collected from the annual reports, the company's website and African financials website for the periods of 2011 to 2015. The General least square (GLS) regression method was used to estimate the parameters of the model. Findings from the study revealed that there is a significant relationship between institutional investors, managerial ownership and quality of financial disclosure.

III. METHODOLOGY

The survey research design and *ex post facto* research design were adopted for this study. The survey research design was carried out using primary data collected through the use of questionnaire and *ex-post facto* design was used to justify the use of secondary data - annual financial statements which would not be manipulated. The target population for this study would be staff of the selected deposit money banks in Lagos State, Nigeria. The population of respondents in this category is 450 while the secondary data was made up of all Deposit money banks in Nigeria. The population of respondents from the selected banks is 450 (CBN, 2019). The sample size for this study was made up of 10 selected deposit money banks listed on the Nigerian Stock Exchange (NSE). The sampling technique adopted was judgemental sampling technique, meaning the judgement of the researcher was used in selecting items which the researcher considers as representative of the population because of the ease of finding relevant information for the selected banks.

A content validity was used for the study. The questionnaire was submitted to the researcher's supervisor, a research statistician and a specialist in the field of research for verification and correction in order to establish an accurate criterion of the validity of the instrument and all necessary corrections were made before they were administered. Using Statistical Package for Social Sciences (SPSS) to test the reliability, the result ($\alpha=0.752$) was obtained;

Model Specification

$Y = f(X)$
 X = Corporate Governance
 Y = Financial Reporting Quality
Sub-Variables for Y are;
 $Y = (y_1, y_2, y_3)$
(Primary Data)
 $y_1 =$ Faithful representation (FR)
 $y_2 =$ Relevance (RV)

$y_3 =$ Comparability (CM)
Sub-Variables for Y are;

$Y = (y_1)$
(Secondary Data)
 $y_1 =$ Timely Preparation (TP)
Sub-Variables for X are;
 $X = (x_1, x_2, x_3, x_4)$
(Primary Data)
 $x_1 =$ Shareholders Assembly (SA)
 $x_2 =$ Board of Directors (BD)
 $x_3 =$ Supervision and Control (SC)
 $x_4 =$ Transparency and Publicity (TP)

Sub-Variables for X are;
 $X = (x_1, x_2, x_3, x_4,)$
Secondary Data
 $x_1 =$ Board Independence (BI)
 $x_2 =$ Board Size (BS)
 $x_3 =$ Ownership Structure (OS)
 $x_4 =$ Board Diversity (BD)
 $x_5 =$ Audit Committee (AC)

Functional Relationship (Primary Data)

FR = f(SA, BD, SC, TP)(Model 1)

RV = f(SA, BD, SC, TP).....(Model 2)

CM = f(SA, BD, SC, TP).....(Model 3)

(Secondary Data)
 TP = f(BI, BS, OS, BD, AC).....(Model 4)

Model Specification (Primary Data)

$FR = \alpha + \beta_1 SA_i + \beta_2 BD_i + \beta_3 SC_i + \beta_4 TP_i$(Model 1)

$RV = \alpha + \beta_1 SA_i + \beta_2 BD_i + \beta_3 SC_i + \beta_4 TP_i$(Model 2)

$CM = \alpha + \beta_1 SA_i + \beta_2 BD_i + \beta_3 SC_i + \beta_4 TP_i$(Model 3)

(Secondary Data)

$TP = \alpha + \beta_1 BI_{it} + \beta_2 BS_{it} + \beta_3 OS_{it} + \beta_4 BD_{it} + \beta_4 AC_{it}$(Model 4)

$\beta_0 =$ Intercept
 $\beta_1 - \beta_4 =$ Coefficients
 $\mu_i =$ error term

Method of Data Analysis

The study employed multiple regression analysis. Multiple regression analysis was used to examine the effect of corporate governance on financial reporting quality of Nigerian deposit money banks. The coefficients of the regression analysis was used to determine the type of relationship between the dependent and independent variables and the coefficient of determination (R-square) was used to explain the degree to which the independent variables affect the variations in the dependent variables.

IV. RESULTS AND DISCUSSIONS

Test of Hypothesis One (H₀₁)

Regression Estimate

Variable	Model 1			
	Coefficient	Std Error	t-Stat.	Prob.
C	1.855	0.137	13.512	0.000*
SA	0.368	0.015	24.179	0.000*
BD	0.271	0.037	7.380	0.000*
SC	-0.142	0.024	-5.924	0.000*
TP	0.054	0.020	2.681	0.008*
R ²	0.600			
Adjusted R ²	0.596			
S.E of Reg	0.23234			
F-Statistic	161.994			
Prob.(F-Stat)	0.000*			
Obs	437			

Dependent Variable: Faithful Representation

*significance at 5%

Source: Researcher's Study, 2019

Model 1

$$FR_i = \alpha_1 + \beta_1 SA_i + \beta_2 BD_i + \beta_3 SC_i + \beta_4 TP_i + \mu_i$$

$$FR_i = 1.855 + 0.368SA_i + 0.271BD_i - 0.024SC_i + 0.054TP_i$$

Interpretation

Hypothesis one of this study aimed to examine if shareholders assembly, board of directors, supervision and control, transparency and publicity have no significant effect on the faithful representation of financial report of Nigeria deposit money banks. In fulfillment of the objective one, research question one and hypothesis one of this study, shareholders assembly, board of directors, supervision and control, transparency and publicity were used as independent variables while faithful representation of financial reporting quality was used as dependent variable. Observable in the result presented above, the independent variables employed were examined and decisions were made using the p-values of the results. Considering the signs and magnitude of the estimated parameters, the values of the coefficient of shareholders assembly, board of directors, supervision and control; and transparency and publicity are all positive except supervision and control whose coefficient is negative. A unit change in positive coefficient (independent variables) will increase the faithful representation while a unit change in negative coefficient as supervision and control will decrease the faithful representation of financial reporting quality by 0.142.

The adjusted R² value of 59% for shareholders assembly, board of directors, supervision and control, transparency and publicity reassured the ability of the independent variables to collectively explain any variation in the dependent variable up to these numbers of percentage even if the observations and variables are infinitely enlarged. The explanatory power of the regression model with an adjusted R² of 0.596 is impressive. This implies that there is good fit of the model, showing that there is a strong positive relationship between the regressors (independent variables) and the regressed (dependent variable). The t-statistics reflects the individual significance of the variables in the model. From the above presented result, shareholders assembly, board of

directors, supervision and control; and transparency and publicity have significant effect on the faithful representation of financial reporting quality at 5% level of significance. The F-statistics measures the overall performance of the model employed in the study. At a level of significance 0.05, the F-Statistics is 161.994, while the p-value of the F-Statistics is 0.000 which is less than 0.05 adopted. The study therefore rejected the null hypothesis which means that shareholders assembly, board of directors, supervision and control and transparency and publicity significantly affect faithful representation of the selected banks in this study.

Test of Hypothesis Two (H₀₂)

Regression Estimate

Variable	Model 2			
	Coefficient	Std Error	t-Stat.	Prob.
C	0.762	0.099	7.727	0.000*
SA	-0.150	0.017	-8.674	0.000*
BD	0.477	0.011	41.996	0.000*
SC	0.143	0.023	6.269	0.000*
TP	0.342	0.018	18.798	0.000*
R ²	0.900			
Adjusted R ²	0.899			
S.E of Reg	0.14473			
F-Statistic	968.894			
Prob.(F-Stat)	0.000*			
Obs	437			

Dependent Variable: Relevance

*significance at 5%

Source: Researcher's Study, 2019

Model 2

$$RV_i = \alpha_1 + \beta_1 SA_i + \beta_2 BD_i + \beta_3 SC_i + \beta_4 TP_i + \mu_i$$

$$RV_i = 0.762 - 0.150SA_i + 0.477BD_i + 0.1477SC_i + 0.342TP_i$$

Interpretation

Hypothesis two of this study aimed to examine if shareholders assembly, board of directors, supervision and control, transparency and publicity have no significant effect on the relevance of financial report of Nigeria deposit money banks. In fulfillment of the objective two, research question two and hypothesis two of this study, shareholders assembly, board of directors, supervision and control, transparency and publicity were used as independent variables while the relevance of financial reporting quality was used as dependent variable. Observable in the result presented above, the independent variables employed were examined and decisions were made using the p-values of the results. Considering the signs and magnitude of the estimated parameters, the values of the coefficient of shareholders assembly, board of directors, supervision and control; and transparency and publicity are all positive while the coefficient of shareholders assembly is negative. A unit change in shareholders assembly will decrease the relevance of financial reporting quality by 0.150, a unit change in board of directors, supervision and control, transparency and publicity will increase the relevance of financial reporting quality by 0.477, 0.143, and 0.342 respectively. The value of the constant imply that if the independent variables

employed do not exist, the relevance of financial reporting quality will maintain a positive value of 0.762.

The adjusted R² value of 90% for shareholders assembly, board of directors, supervision and control, transparency and publicity reassured the ability of the independent variables to collectively explain any variation in the dependent variable up to these numbers of percentage even if the observations and variables are infinitely enlarged. The explanatory power of the regression model with an adjusted R² of 0.899 is impressive. This implies that there is good fit of the model, showing that there is a very strong positive relationship between the regressors (independent variables) and the regressed (dependent variable).

The t-statistics reflects the individual significance of the variables in the model. From the above presented result, shareholders assembly, board of directors, supervision and control; and transparency and publicity have significant effect on the relevance of financial reporting quality at 5% level of significance. The F-statistics measures the overall performance of the model employed in the study. At a level of significance 0.05, the F-Statistics is 968.894.994, while the p-value of the F-Statistics is 0.000 which is less than 0.05 adopted, The study therefore rejected the null hypothesis which means that shareholders assembly, board of directors, supervision and control and transparency and publicity significantly affect relevance of financial report of deposit money banks in Nigeria.

Test of Hypothesis Three (H₀₃)

Table 3 Regression Estimate of corporate governance proxies on comparability

Variable	Model 3			
	Coefficient	Std Error	t-Stat.	Prob.
C	3.693	0.170	21.758	0.000*
SA	0.062	0.023	2.707	0.007*
BD	0.668	0.032	20.808	0.000*
SC	-0.626	0.042	-15.026	0.000*
TP	0.114	0.030	3.801	0.000*
R ²	0.610			
Adjusted R ²	0.606			
S.E of Reg	0.26089			
F-Statistic	168.993			
Prob.(F-Stat)	0.000*			
Obs	437			

Dependent Variable: Comparability

*significance at 5%

Source: Researcher’s Study, 2019

Model 3

$$CM_i = \alpha_1 + \beta_1 SA_i + \beta_2 BD_i + \beta_3 SC_i + \beta_4 TP_i + \mu$$

$$CM_i = 3.693 + 0.062SA_i + 0.668BD_i - 0.626SC_i + 0.610TP_i$$

Interpretation

From table 3, the independent variables employed were examined and decisions were made using the p-values of the results. Considering the signs and magnitude of the estimated parameters, the values of the coefficient of shareholders assembly, board of directors, supervision and control; and transparency and publicity are all positive except for supervision and control whose

coefficient is negative. A unit change in shareholders assembly, board of directors and transparency and publicity will increase financial report comparability by 0.062, 0.668 and 0.111 respectively while a unit change in supervision and control will decrease financial report comparability by 0.626. The value of the constant imply that if the independent variables employed do not exist, financial report comparability will maintain a positive value of 3.693.

The adjusted R² value of 61% for shareholders assembly, board of directors, supervision and control, transparency and publicity reassured the ability of the independent variables to collectively explain any variation in the dependent variable up to these numbers of percentage even if the observations and variables are infinitely enlarged. The explanatory power of the regression model with an adjusted R² of 0.606 is impressive. This implies that there is good fit of the model, showing that there is a strong positive relationship between the regressors (independent variables) and the regressed (dependent variable).

The t-statistics reflects the individual significance of the variables in the model. From the above presented result, shareholders assembly, board of directors, supervision and control; and transparency and publicity have significant effect on financial report comparability at 5% level of significance. The F-statistics measures the overall performance of the model employed in the study. At a level of significance 0.05, the F-Statistics is 168.993, while the p-value of the F-Statistics is 0.000 which is less than 0.05 adopted, the study therefore rejected the null hypothesis which means that shareholders assembly, board of directors, supervision and control and transparency and publicity significantly affect financial report comparability of the selected banks in this study.

Test of Hypothesis Four (H₀₄)

Table 4 Regression Estimate of corporate governance proxies on Timely preparation

Variable	Model 4			
	Coefficient	Std Error	t-Stat.	Prob.
C	0.259	0.388	0.668	0.506
BI	0.098	0.017	5.809	0.007*
BS	0.093	0.015	6.078	0.000*
OS	0.210	0.022	9.503	0.000*
BD	0.257	0.018	13.950	0.000*
AC	0.222	0.076	2.914	0.005*
R ²	0.816			
Adjusted R ²	0.805			
S.E of Reg	0.43217			
F-Statistic	74.307			
Prob.(F-Stat)	0.000*			
Obs	437			

Dependent Variable: Timely Preparation

*significance at 5%

Source: Researcher’s Study, 2019

Model 4

$$TP_i = \alpha_1 + \beta_1 BI_i + \beta_2 BS_i + \beta_3 OS_i + \beta_4 BD_i + \beta_5 AC_i + \mu_1$$

$$TP_i = 0.259 + 0.098BI_i + 0.093BS_i + 0.210OS_i + 0.257TP_i + 0.222AC_i$$

Interpretation

Hypothesis four of this study aimed to examine if board independence, board size, ownership structure, board diversity and audit committee have no significant effect on timely preparation of financial report of Nigeria deposit money banks. In fulfillment of the objective four, research question four and hypothesis four of this study, board independence, board size, ownership structure, board diversity and audit committee were used as independent variables while timely preparation of financial reporting quality was used as dependent variable. Observable in the result presented above, the independent variables employed were examined and decisions were made using the p-values of the results. Considering the signs and magnitude of the estimated parameters, the values of the coefficient of board independence, board size, ownership structure, board diversity and audit committee are all positive. A unit change in board independence, board size, ownership structure, board diversity and audit committee will increase timely preparation of financial reporting quality by 0.098, 0.093, 0.210, 0.257 and 0.222 respectively. The value of the constant imply that if the independent variables employed do not exist, timely preparation of financial reporting quality will maintain a positive value of 0.259.

The adjusted R^2 value of 81% for R^2 reassured the ability of the independent variables to collectively explain any variation in the dependent variable up to these numbers of percentage even if the observations and variables are infinitely enlarged. The explanatory power of the regression model with an adjusted R^2 of 0.805 is not impressive. This implies that there is no good fit of the model. However, from the regression value, the independent variables have a very strong positive relationship with the dependent variable.

The t-statistics reflects the individual significance of the variables in the model. From the above presented result, board independence, board size, ownership structure, board diversity and audit committee have significant effect on timely preparation of financial reporting quality at 5% level of significance. The F-statistics measures the overall performance of the model employed in the study. The F-statistics values for this study is 74.307. The significance of this variable is ascertained using the p-values. At a level of significance 0.05, the F-Statistics is 74.307, while the p-value of the F-Statistics is 0.000 which is less than 0.05 adopted, the study therefore rejected the null hypothesis which means that board independence, board size, ownership structure, board diversity and audit committee have significant effect on timely preparation of financial report of Nigeria deposit money banks.

V. 4. DISCUSSION OF FINDINGS

This study was set out to examine the effect of corporate governance on financial reporting quality in Nigeria deposit banks. The peculiarity of this study affords the chronological presentation of this chapter.

The first part dealt with demographic characteristics of the respondents. The summary of the responses obtained from the returned copies of the questionnaire showing that respondents between the age of 31-40 has the highest number of frequency (238) with 54.5% compared to the respondents between the age range 20-30 and 41-50 with number of frequency and percentage

of 120 (27.5%) and 79 (18.1%) respectively. Also, it can be concluded that most of the respondents are mostly male given by result obtained in table 4.2 above which shows that 63.6% with frequency 278 are male, while the remaining 36.4% with frequency 159 are female. Also, from the result obtained in terms of academic qualifications, it is evident that respondents that falls to the class of MSc/MBA/PhD as the highest number of respondent of 54.7% with frequency 239, while respondents that falls between the class of OND/NCE or Equivalent and HND/BSC or Equivalent has the lowest number of respondents of 8.9% with frequency 39 and 32.1% with frequency 159 respectively. Likewise, from the table 4.2 above, most of the respondents occupied the position of the assistant managers which is shown by the number of frequency 318 with 72.8% compared to the manager with the frequency 119 with 27.2%. Lastly, respondents with below 5 years working experience has the highest number of frequency of 375 with 81.7% which are the assistance managers, while the remaining respondents fall to the class of 5-10 years working experienced with frequency 80 and has 18.3% and these are middle level managers of the banks from which the information were obtained.

The second section focused on testing the hypotheses previously stipulated through the use of regression analysis. The regression estimate of model 1 shows corporate governance significantly affect faithful representation of the selected Banks in this study. This result is inconsistency with the *a priori* expectation that there is no significant impact of corporate governance on the faithful representation of financial report of Nigeria deposit money banks. The result was corroborated by the probability value of the *F* statistics of 0.000 which shows that the regression result is statistically significant because this is less than 5%, the level of significant adopted for this study. This implies that corporate governance thus impact on faithful representation of the financial report of the selected Nigeria money banks. Our findings is consistent with the study of Aliyu and Ishaq (2015) where they conclude that the steward's behaviour is pro-organizational and collectivists and has higher utility than individualistic, self-serving behavior, and the steward's behaviour will not depart from the interest of the organization because the steward seeks to attain the objectives of the organization. Also, Joh (2019). in his research, states that where shareholder wealth is maximized, the steward's utilities are optimized too, because organizational success will serve most requirements and the stewards will have a clear mission.

The regression estimates of model 2 shows that corporate governance significantly affects Financial Report Relevance (FR) of the selected Banks in this study. This result is inconsistency with the *a priori* expectation that there is no significant effect of corporate governance on the relevance of financial report of Nigeria deposit money banks. The result was also corroborated by the probability of the *F* statistics 0.000 which shows that the regression result is statistically significant because this is less than 5%, the level of significant adopted for this study. This implies that corporate governance thus impact on relevance of the financial report of the selected Nigeria money banks. The findings of this study is consistent with the study of Beasley (2019), who in his study affirms that a firm receives permission to operate from the society and is ultimately accountable to the society for how it operates and what it does because society provides corporations

the authority to own and use natural resources and to hire employees.

The regression estimate of model 3 shows that corporate governance significantly affect financial report comparability (COMP) of the selected Banks in this study. This result is inconsistent with the *a priori* expectation that there is no significant effect of corporate governance on the comparability of financial report of Nigeria deposit money banks. The result was also corroborated by the probability of the *F* statistics 0.015 which shows that the regression result is statistically significant because this is less than 5%, the level of significant adopted for this study. This implies that corporate governance thus impact on comparability of the financial report of the selected Nigeria money banks. Although this study could not find any previous research study that corroborate the above hypothesis, thus it can be concluded that corporate governance greatly impact the comparability of financial report of deposit money banks in Nigeria.

Lastly, the regression estimate of model 4 shows that corporate governance significantly affect timely preparation (TP) of financial reports of the selected Banks in this study. This result is consistent with the *a priori* expectation that there is a significant effect of corporate governance on the timely preparation of financial report of Nigeria deposit money banks. The result was also corroborated by the probability of the *F* statistics 0.001 which shows that the regression result is statistically significant because this is less than 5%, the level of significant adopted for this study. This implies that corporate governance thus impact on timely preparation of the financial report of the selected Nigeria money banks.

VI. CONCLUSION

This study examined effect of Corporate Governance on Financial Reporting Quality of Deposit Money Banks (DMBs) in Nigeria. Numerical description of all variables under study was captured to depict the movement of values and determine the fluctuations of each of the independent variables with the dependent variables.

Findings of this study therefore provide insight into the effect of corporate governance on Financial Reporting Quality which has been measured by Faithful Representation (FR), Relevance (R), Comparability (COMP), Timely Representation (TR), Understandability (U), of selected money banks in Nigeria for the period between 2009 and 2018. It also provides an affirmation of the extent to which the variations in the dependent variable are caused by the independent variables covered in the models as depicted by the R-squared and adjusted R-squared. Thus, the research concluded that corporate governance has a significant effect on financial reporting quality of the selected deposit money banks (DBMs) in Nigeria.

VII. RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are offered to issue of corporate governance and financial reporting quality;

- i. Top executives should have better understanding of the new code of corporate governance to improved standard of financial reporting quality for greater accountability and transparency.
- ii. Regulators should review on timely basis governance regulations in order to assess its impact on financial reporting quality.
- iii. Regulators should take into consideration the industry norms especially the existing sectoral codes in developing unified corporate governance codes

VIII. CONTRIBUTION TO KNOWLEDGE

This study has made the following contributions to knowledge;

- i. The study investigated the effect of corporate governance on financial reporting Quality of Deposit Money Banks in Nigeria. Previous related studies have dealt largely on the effect of Corporate Governance on Financial Reporting Quality of deposit money banks in Nigeria without considering the moderating effect as used in this study. Thus, this study provides empirical evidence of the effect of Corporate Governance on Financial Reporting Quality measured by Faithful Representation (FR), Relevance (FR), Comparability (COMP), Timely Preparation (TIM) of the selected Deposit Money Banks in Nigeria.
- ii. The study influenced the existence of internal control systems of banks in Nigeria. It also add to academicians and future researchers in the field of Accounting and other related field and enhance literature of the subject matter that will be available for the existing and potential researchers to make use as one of the useful materials.
- iii. In practice, the study would assist investors in the Nigerian deposit money banks to examine whether earnings reported are still adequate to meet their expectations and to take into consideration if they should revise their expectations from the organization's performance. More also, the study contributed to national provision of the government that relates to the adoption and implementation of better internal control measures.
- iv. Finally, it broadens the expectations of policy makers and assist them to know the practical implications of converting to internal control and corporate performance.

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A DFT study of Optoelectronic Properties and Electronic Structure of Edge functionalization of phosphorene interacting with polythiophene

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Abstract- The functionalization of phosphorene and its electronic interactions with the conductive polymer had been examined in this research. Edge functionalization of phosphorene is very important because it has been found to be more reactive at the edge of a phosphorene when compared to covalently bonded phosphorus in the zigzag direction. We have described the interaction of phosphorene with polythiophene, a conducting polymer to study its optoelectronic properties and the substituent effect of polythiophene on electronic properties. For the edge functionalization of phosphorene interacting with polythiophene P-X-PT. we select four different kinds of moieties, where (COOH, NH₂ and OH). For polythiophene polymer we were considering with number of state six. Density functional theory (DFT) approach using MPW1PW91 at the theory level 6-31(G) on Gaussian 09 package was use for optical properties. The transfer of charge between molecules, frontier molecular orbitals (FMOs), state density (DOS), transition density matrix (TDM) and binding energy is carried out for the determination of opto-electronics properties and UV / Vis spectrum.

I. INTRODUCTION

It's predicted that in the coming years our world will need new energy sources. Since of the broad range of possibilities for incorporation into electronic and conversion devices in the next decade, two-dimensional materials have become the most important research areas for nanomaterials. Two-dimensional, few-layer black phosphorous has recently attracted attention from society and material science (Xia, Wang, & Jia, 2014). It is chemically inert, and has endless land transportation. Any semiconductor's electronic properties had been crucial for electronic applications (Lu et al., 2014). The electronic properties for phosphorene nanotubes depend entirely on the crystal orientation of the tubes (Carvalho, Rodin, & Neto, 2014; Tran & Yang, 2014). Such findings find that certain ribbon edges play a critical role in the properties of optoelectronics.

Phosphorene properties with good properties such as band gap and carrier mobility, due to high demand for reliable performance products, several more layer materials had been discovered in the direction. Among the phosphorous allotropes (Appalakondaiah, Vaitheeswaran, Lebegue, Christensen, & Svane, 2012), blue phosphorene is considered to be the most stable 2D layer material with a fixed layer structure due to its low van der Waals interlayer interaction. (R. Hultgren, N. Gingrich, & B. J. T. J. o. C. P. Warren, 1935; Thurn & Kerbs, 1966).

Phosphorene has many industrial uses, as used in flares, matchsticks, organic fertilizers and napalm bombs (Chou et al., 2001). The quest for additional layer materials is required in their main possession for a variety of high-performance devices, such as bandgap. Blue phosphorous (BP) for having a van der Waal's forces and fixed layer structure is announced as a new member of 2D layer material family because of most stable allotropes among the group (R. Hultgren, N. Gingrich, & B. Warren, 1935). Phosphorene for its unique structural characterization differentiate itself from 2D layer material. It has a packed structure by its armchair direction and a bilayer formation laterally zigzag direction. This structure can easily be seen in its local bonding configuration (Liu et al., 2014).

Black phosphorene shows different kinds of strong properties like anisotropic electronic and optical properties which are far different from other 2D structure which has been investigated so far. To examine the anisotropic electronic structure, novel photonic responses and excitonic interaction a large number of studies were performed (Cai, Zhang, & Zhang, 2014; Li & Appelbaum, 2014).

Attachment of different groups like OH, -NH₂, COOH, and CN etc. with phosphorene and polythiophene composite is expected to produce a material with excellent optoelectronic properties for various advanced applications. To design the three-dimensional structure of phosphorene with edge groups like H, COOH, NH₂, OH and polythiophene.

Optical properties also respond to environmental incentives, affected color shifts in reaction to changes in solvent, applied potential, temperature and binding to the other molecules (Mastragostino & Soddu, 1990). Polythiophenes have been widely studied and have been found an excess of applications (Beck & Rüetschi, 2000; Bobade, 2011; Cosnier & Bioelectronics, 1999; Parthasarathy & Martin, 1994). Polythiophene and its derivatives are of great concern in device applications (Béra Abérem et al., 2006; Ho, Najari, &

Leclerc, 2008; Le Floch et al., 2005; Le Floch, Ho, & Leclerc, 2006; Ramírez-Solís, Kirtman, Bernal-Jáquez, & Zicovich-Wilson, 2009), because of the high stability, structural modification and solution processability (Coppo, Cupertino, Yeates, & Turner, 2003; Mehmood, Al-Ahmed, Hussein, & Reviews, 2016). Polythiophene has been widely studied using theoretical and experimental methods (Kumar, Bokria, Buyukmumcu, Dey, & Sotzing, 2008; Sugiyasu, Song, & Swager, 2006).

II. MATERIALS AND METHODS

Density functional theory is applicable in various fields of chemistry like organic, inorganic, pharmaceutical and organometallic. It also deals with the solid phase as well as gas liquid (Swart, van der Wijst, Guerra, & Bickelhaupt, 2007).

The behavior of an electron is described by the orbital in the presence of net field of all other electrons (Young, 2004). AM1 is best method for the result of activation energy in than method of MNDO. In Aluminium case AM1 method is best for the results as compared to the PM3 but AM1 method doesn't give info about the paramidalization of nitrogen.

The calculations of density functional theory results may be outstanding and very poor depending on precision. It depends on functional and basic set. Production of new density functional is popular area of research now a days. Density functional theory (DFT) gives the outstanding results of organic compounds (Grimme, Antony, Ehrlich, & Krieg, 2010). HF method based on wave function. Internal density of electron is based on geometry of ground state molecules (Moore & Clarke, 1983).

Time dependent calculations provides us wave function that can be oscillate around ground and first excited state. It is more convenient way to take the values of ground state and excited state from calculations (de Wergifosse & Grimme, 2018). To calculate the geometry to the lowest possible energy, energy and energy gradients are calculated by the program (Schlegel, 1982). Calculation of atomic arrangement which increases the molecular stability is the main objective of molecular geometry optimization. Molecules are more stable at lowest energy level. There are many methods to calculate the lowest energy levels. By creating a potential surface we can observe the lowest energy level, it is a mathematical relationship geometries of different molecules (Barone, Cossi, & Tomasi, 1998).

Different tools are used in computational chemistry to observe the molecular excited states. Molecular excited states can be observed and calculated by different techniques and energy values and with the help of these calculations, wave function and other properties of molecules can be expected. For the study of spectroscopy, reaction mechanism and phenomenon of excitation these calculations are very important. To observe the ground state a wave functional same techniques and tools are used. The excited states in which geometry of ground states is apply for excitation of vertical energies (Young, 2004).

Geometry of ground state is used in vertical excitation energies therefore, it is likely the fast process to design. For excitation of electronic processes, it is more advantageous e.g. UV, spectroscopy of photo-electron. Optimized values of excited states are used in adiabatic excitation energies. When life of excited state is long, their result will closer to the experimental results (Young, 2004). Basic reaction self-consistent field is IEFPCM. PCM uses the significant of numeric which is used for calculating the effect of solvent on designed molecules (Deskevich, Nesbitt, & Werner, 2004).

In Hartree-Fock (HF) method and density functional theory (DFT) basis set is used whereas most semi-empirical (SE) methods use predefined basis set. Basic set is defined when calculations of density functional theory and ab-initio performed. Mostly, when we use basic sets of minimal values the accuracy of density functional theory (DFT) is decreases but it shows good result with Hatree-Fock (HF) basic set (Schuchardt et al., 2007). Density functional theory (DFT) for the geometry optimization, has become most efficient and reliable method. DFT is used for geometry optimization and time dependent density functional theory (TD-DFT) is used for excited state.

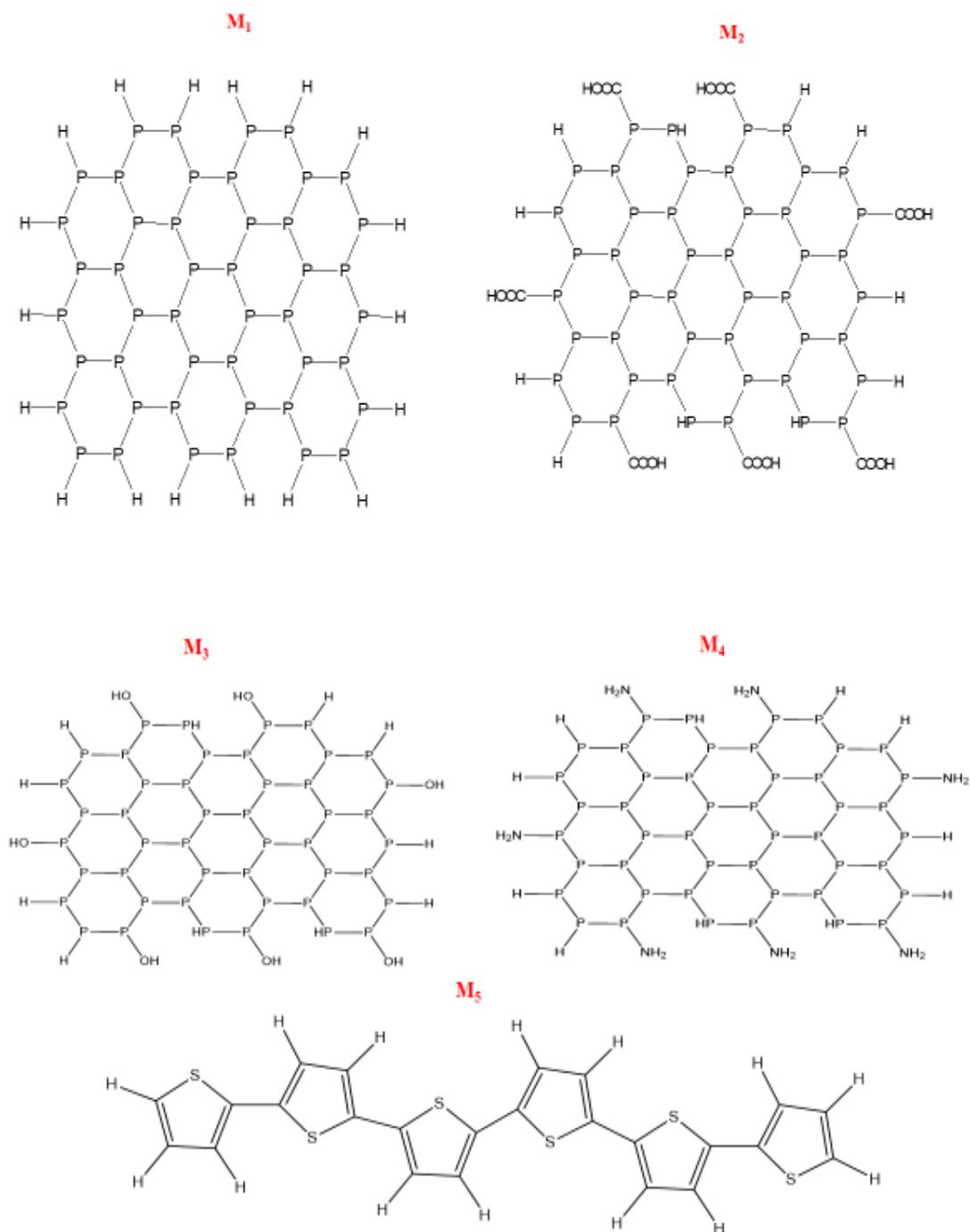


Fig 1: Chemical Structure of Phosphorene and designed molecules M1 to M4.

All calculations were performed on program packages from Gaussian 09. DFT method is used to optimize the configuration of phosphorene, thiophene, and phosphorene molecules with the edge group COOH, phosphorene with the edge group NH₂ and phosphorene with the edge OH. Firstly, all the designed molecules were calculated with DFT with different functions as B3LYP, CAM-B3LYP (Yanai *et al.*, 2004) and MPW1PW91 (Adamo & Barone, 1998) for absorption spectra of designed molecules. MPW1PW91 is the best method for theoretical calculations for these molecules and therefore it was chosen for further optimization of molecules M_1 , M_2 , M_3 , M_4 and M_5 . For the absorption spectra of all of these designed molecules, TD-DFT with B3LYP, CAM-B3LYP and MPW1PW91 with basis set 6-31 G (d, p) are used. We got the best absorption of these molecules with function MPW1PW91/6-31 G (d, p). So that we use MPW1PW91 and basis set 6-31 G (d, p) to perform our further calculations.

III. RESULTS AND DISCUSSIONS

Currently, we use density functional theory with various functions such as B3LYP, CAM-B3LYP and MPW1PW91 with 6-31 G (d, p) basis set to observe the optical and electronic properties of phosphorene with different edge groups and in polythiophene composite. MPW1PW91 was selected best for UV-Visible spectrum for optoelectronic properties.

Optimized molecular structures

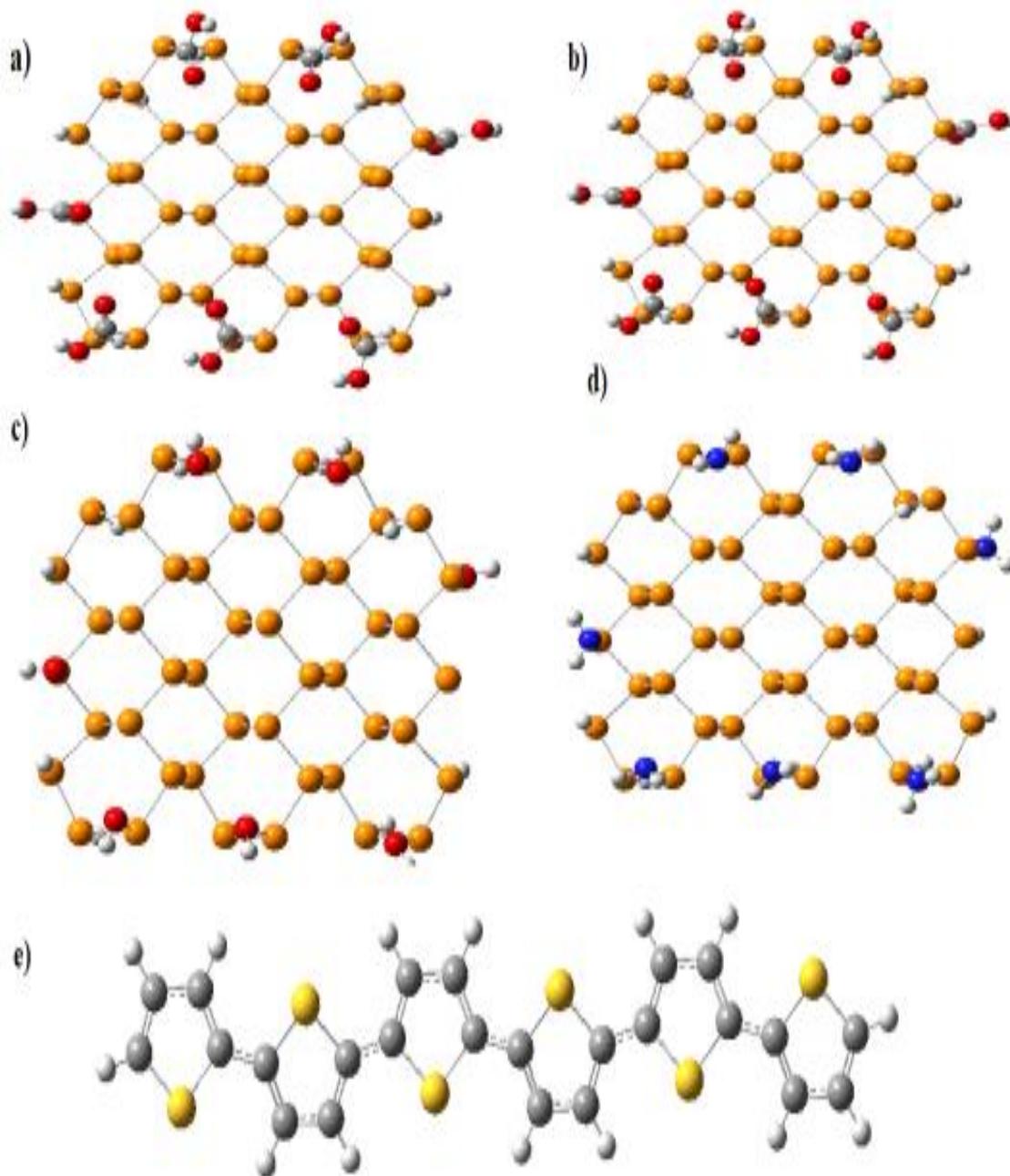


Figure 2. Optimized structure of phosphorene at MPW1PW91 with basis set 6-31G(d,p) attached with a) COOH b) OH c) NH₂ d) polythiophene

Frontier molecular orbitals

The optoelectronics properties are performed on the basis of the distribution pattern of P-X-Pthio's frontier molecular orbitals (X = OH, COOH and NH₂). In FMOs it is possible to show the distribution of electron density around the HOMO and the LUMO. Figures

below show the distribution of FMOs around HOMO and LUMO at ground state of molecules without polymer polythiophene.

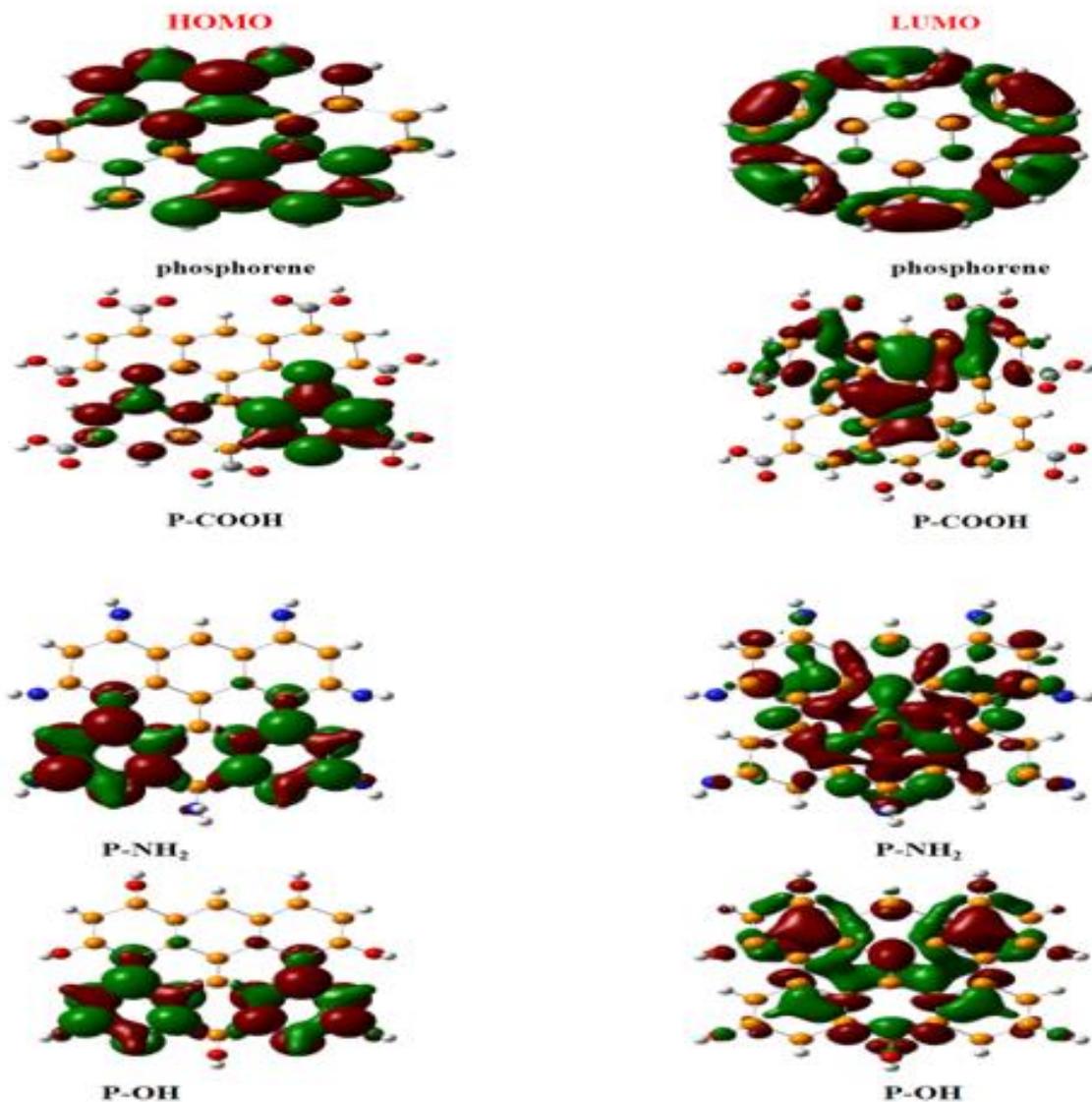


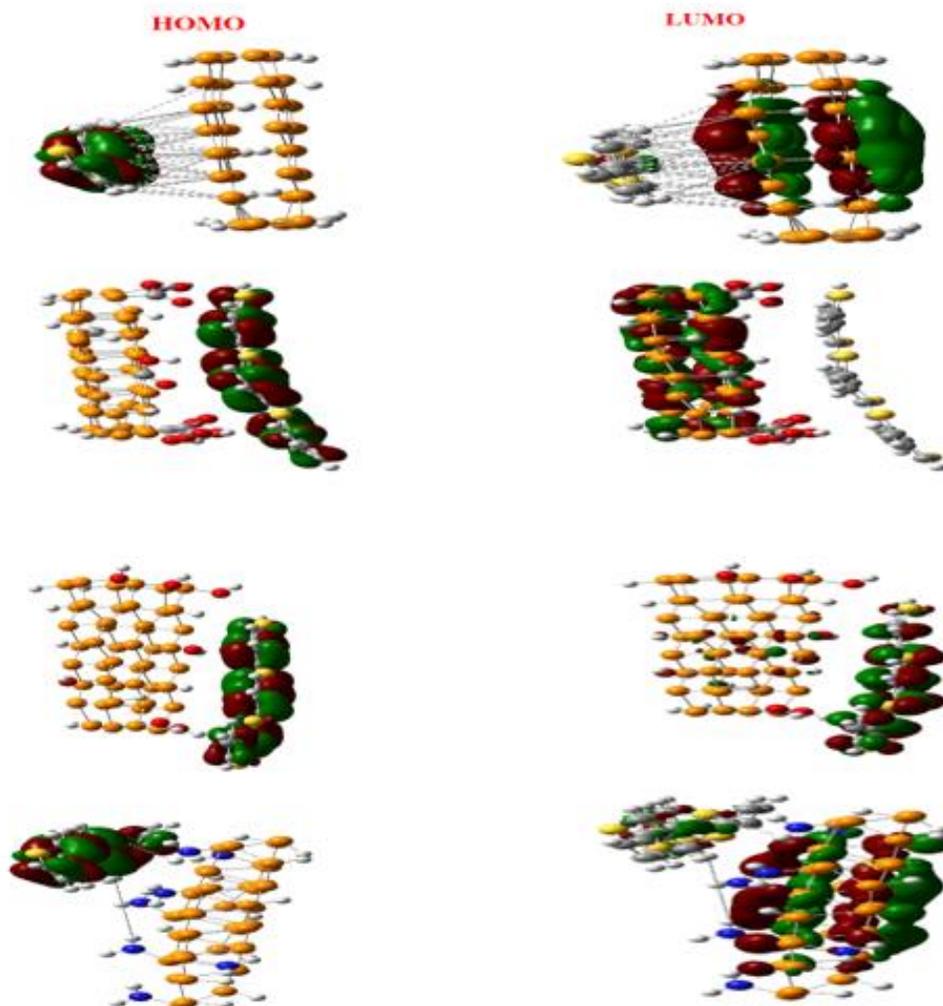
Fig.3 Distribution of FMOs around HOMO and LUMO at ground state of molecules without polymer polythiophene

Table .1 Energy of HOMO(E_{HOMO}), LUMO (E_{LUMO}) and their Energy Gap (E_g) in eV at MPW1PW91/631-G(d,p) level of theory

Molecules	E_{HOMO}	E_{LUMO}	E_g (eV)
P-COOH	-0.230142	-0.07851	0.151632
P-NH ₂	-0.21795	-0.06145	0.1565

P-OH	-0.23151	-0.07731	0.1542
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The increasing order is P-NH₂ > P-COOH > P-OH, the difference in HOMO energies and in the case of LUMO energies the trend varies from P-NH₂ > P-OH > P-COOH. The energy difference between HOMO-LUMO varies from P-COOH > P-OH > P-NH₂. The lowest energy gap is observed in P-COOH which is 0.151632 eV. The developed P-X molecules where X is COOH, NH₂ and OH when it comes into contact with polymer polythiophene. I have designed the plot of FMO's based on HOMO) and LUMO and their



energy gap (E_g).

Figure 4. FMO at ground state of P-Pthio, P-COOH and P-OH pthio

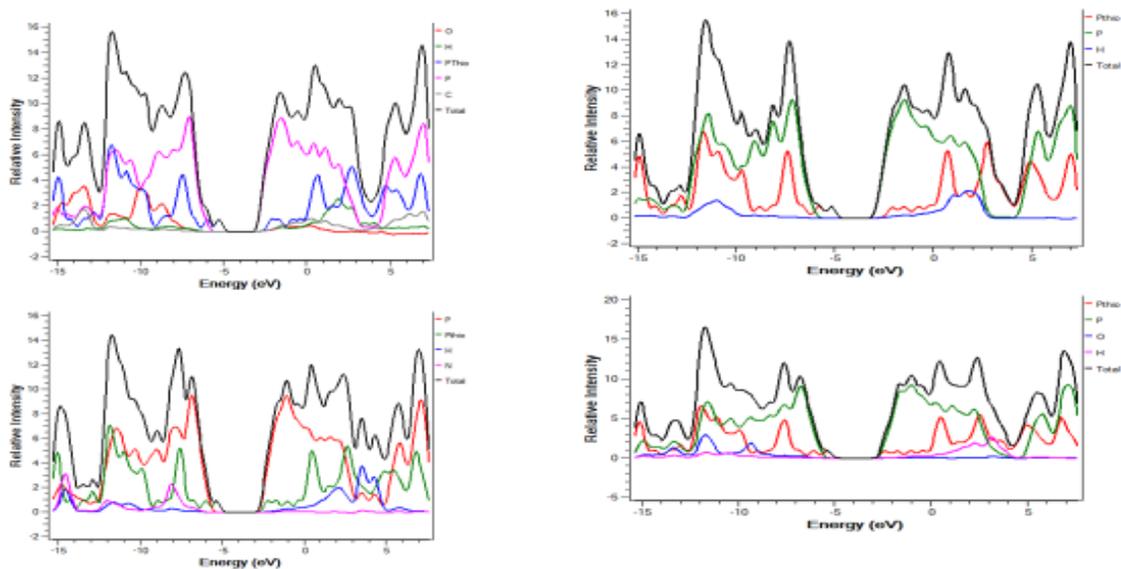
Table .2 Energy of HOMO (E_{HOMO}), LUMO (E_{LUMO}) and energy difference HOMO-LUMO (E_g) at MPW1PW91/6-31G(d,p) level of theory

Molecule	E_{HOMO} (eV)	E_{LUMO} (eV)	E_g (eV)
P-COOH-Pthio	-5.211	-2.539	2.672
P-OH-Pthio	-5.358	-2.390	2.968
P-NH ₂ -Pthio	-5.304	-2.361	2.943

The increasing order varies from P-COOH-Pthio > P-NH₂-Pthio > P-OH-Pthio. While in case of LUMO the trend will be P-NH₂-PT > P-OH-PT > P-COOH-PT energy gap between HOMO and LUMO is P-OH-Pthio > P-NH₂-Pthio > P-COOH-Pthio. Lowest energy gap is observed in P-COOH-PT (2.672). The lowest HOMO value is observed in P-OH-Pthio (-5.358) and lowest energy value of LUMO is observed in P-COOH-Pthio (-2.539 eV).

Density of state (DOS) of phosphorene interaction with polythiophene

Four types of colors in the DOS graph are red, green, black and blue. Green and blue line represents the level of HOMO energy and red line represents the level of LUMO power. The difference between HOMO and LUMO is the band gap and the disparity between red and green reveals the band gap (E_{gap}). The density of state (DOS) of all designed molecules of HOMO and LUMO are shown in figures below:



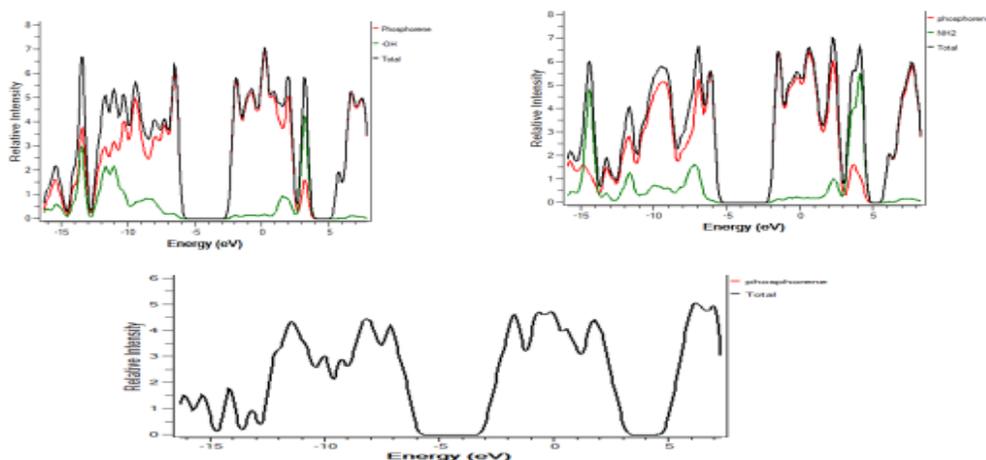


Figure.5 Density of state of P-COOH-Pthio, P-H-Pthio, P-NH₂-Pthio, P-OH-Pthio, Phosphorene, P-COOH, P-NH₂, P-OHs

Optical properties

At the theory stage, MPW1PW91/6-31 G (d, p) was performed to observe the optical properties of phosphorene with different edge groups TD-DFT calculations. It showed the first 10 singlet to singlet excitation transition state, but I considered only the first excitation state because it is the most significant maximum absorption in all four structures as shown in Table 1.

Table .3 Wavelength (nm) oscillator strength, ETC % and E_{ev} for P-H, P-COOH, P-NH₂ and P-OH.

Molecules	Wavelength (nm)	E _{ev}	Oscillation strength (f)	Major contribution
P-H	343.80	3.51	0.03	H-1->L+0(+80%)
P-COOH	366.89	3.36	0.02	H-0->L+0(+56%)
P-NH ₂	344.61	3.43	0.02	H-0->L+0(+82%)
P-OH	371.20	3.41	0.01	H-0->L+1(+68%)

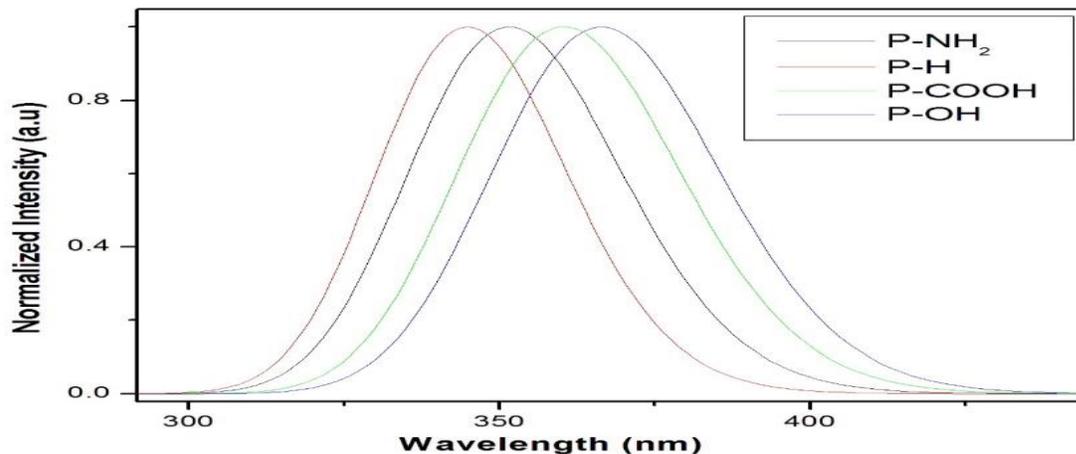


Fig.5 Absorption spectra of P-H, P-COOH, P-NH₂ and P-OH

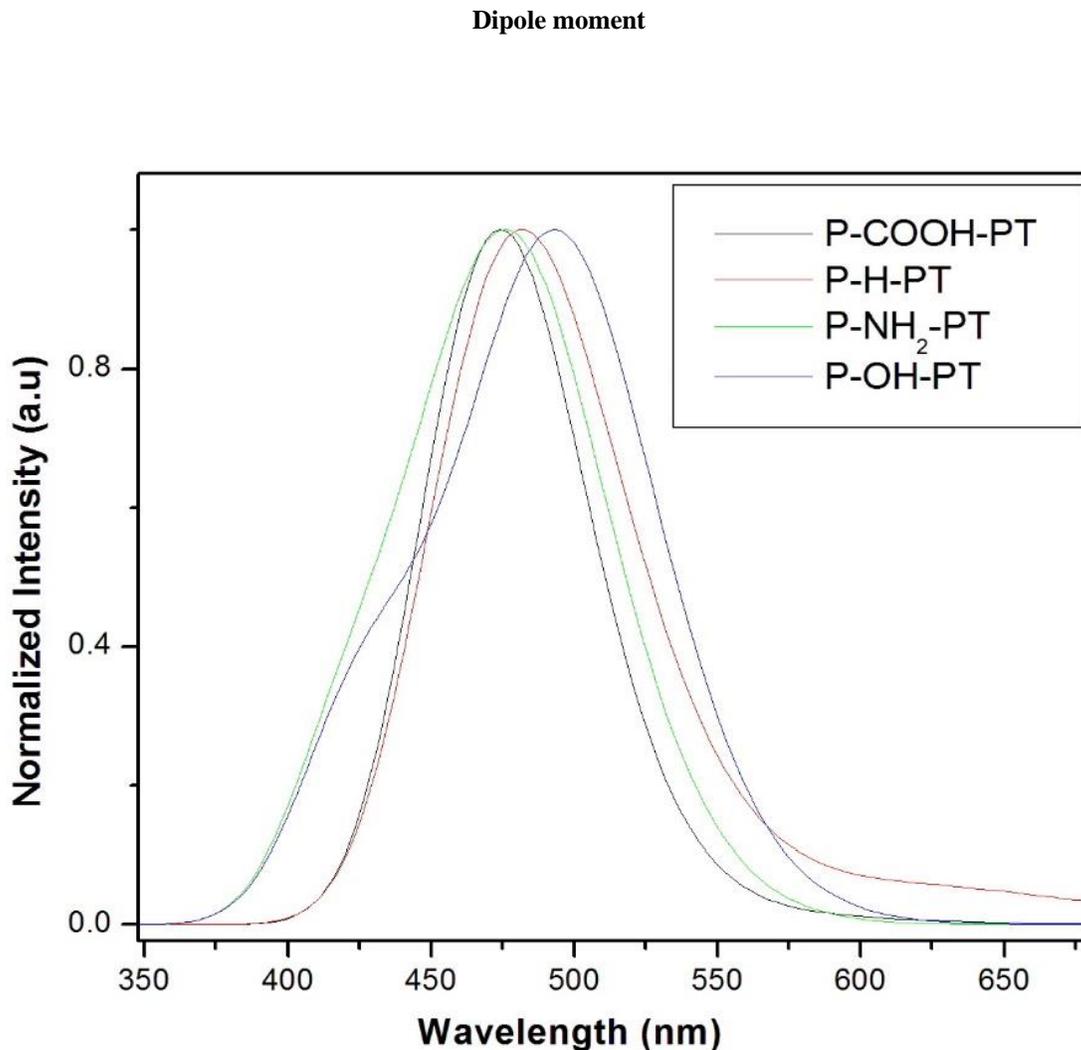
Optical properties of phosphorene edge groups with polythiophene

To study the optical properties of phosphorene edge functionalization with polythiophene. I performed TD-DFT calculations at MPW1PW91/6-31G(d,p) level of theory it showed first 10 singlet to singlet excitation transition but I only consider first excitation state because it is most significant with P-H-Pthio, P-COOH-Pthio, P-NH₂-Pthio and P-OH-Pthio structures with maximum absorption (λ_{max}), oscillator strength (f), electronic transition contribution (ETC %) as shown in table 4.

Table. 4 Wavelength (nm) oscillator strength, ETC % and E_{ev} for P-H-Pthio, P-COOH-Pthio, P-NH₂-Pthio and P-OH-Pthio

Molecules	Wavelength (nm)	E _{ev}	Oscillation strength (f)	ETC %
P-H-Pthio	465	1.96	0.33	H-0->L+0(+96%)
P-COOH-Pthio	473	2.16	1.0	H-0->L+0(+98%)
P-NH ₂ -Pthio	469	2.52	0.6	H-0->L+0(+88%)
P-OH-Pthio	495	2.49	1.0	H-0->L+0(+96%)

Figure.6 Absorption spectra of P-H-Pthio, P-COOH-Pthio, P-NH₂-Pthio and P-OH-Pthio



Dipole moment of all molecules are also calculated with MPW1PW91/6-31G (d,p) level of theory. Greater the dipole moment, greater will be the solubility. Dipole moment of all molecules is given in the table 5. Dipole moment of all molecules are calculated at ground state and as we as excited state. In ground state highest dipole moment of molecule is P-NH₂-PT. Trend of dipole moment at ground state varies form P-NH₂-Pthio > P-OH-Pthio > P-COOH-Pthio.

Table 5 Dipole moments of designed molecules at ground state μ_g and excited state μ_e

Molecule	μ_g	μ_e
P-COOH-Pthio	1.8685	1.8685
P-OH-Pthio	4.8707	4.8704
P-NH ₂ -Pthio	5.7675	5.7671

Transition density matrix (TDM) and exciton binding energy (E_b)

For the estimation of the nature of transition, the transition density matrix of these developed molecules is computed. At the theory level of MPW1PW91/6-31 G (d, p), the TDMs for absorption and emission are calculated in vacuum with S1 state. TDM shows the interaction between donor and acceptor moieties.

Binding energy is inversely proportional to the exciton dissociation. So we can calculate binding energy by taking the difference between energy gap HOMO-LUMO (E_g) and minimum amount of energy for first excitation E_{opt} .

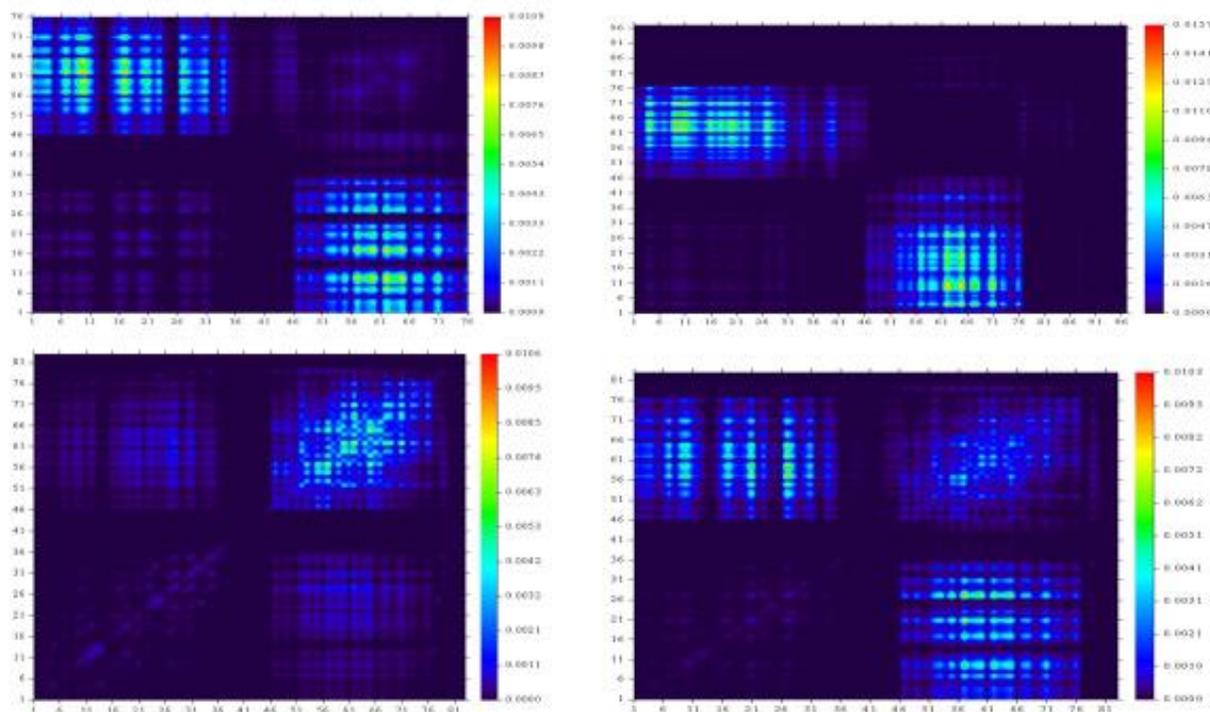


Table 6 Calculated HOMO-LUMO energy gap E_{H-L} , and E_{opt} first singlet excitation energies, exciton binding energies (E_b)

Molecules	E_{H-L} (eV)	E_{opt} (eV)	E_b (eV)
P-COOH-Pthio	2.638	2.14	0.49
P-OH-Pthio	2.967	2.48	0.48
P-NH ₂ -Pthio	2.936	2.50	0.43

IV. CONCLUSION

To research the optical and electronic properties of phosphorene edge functionalization with conducting polymer polythiophene we are performing first principle DFT calculations. We select three moieties for COOH, NH₂ and OH edge functionalization's. Lowest band gap is seen in P-COOH-, and this molecule also shows better oscillator strength. Calculations for UV / Vis spectra were performed using TD-DFT. P-COOH- wavelength is 473 nm, and oscillator strength is 1.0. FMO was determined for the HOMO and LUMO distribution. Charge transfer is distributed precisely within the P-COOH- molecule. Calculations of the transition density matrix were performed in P-COOH- for electronic excitation between molecules and better result for TDM and binding energy which confirms the TDM result.

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Patient care: From social workers point of view

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Abstract- Patient care is a demanding concept that requires a lot of time and attention in terms of activities that meets the expectations, needs, and desires of the patient and their family to raise their standard of health, comfort, and high quality of life. Patient care refers to the services proffer by health professionals /workers to prevent illness .The chief aim of patient care is to give health care benefits to make better health outcomes and therefore give special attention to psychological care as well as emotional well being .This article reflects the service renders by health professional who works for the overall benefits of patient. The steps to improve patient care have also been clearly defined .This article lays emphasis on paying attention for the betterment of the patient's health in terms of medical aspects.

Index Terms- Patient care, health professional, team training, health care, technology

I. INTRODUCTION

Patient care is a practice for caring for patients and their families, when one create patient care more important, the health sector / organization will grow and flourish more rapidly. Giving medical care attention to patients and try to heal and cure them quickly should be the first priority, only then the health care sector will function properly and produces good and better results. Patient care is a different series of steps that includes a set of different pieces of work to be done such as treatment, counseling, patient education administration of medication, collection samples of patients tissues , fluids ,continuous observation of patient health ,offering emotional assistance, establish active role in all aspects. Patient care comprises of giving attention ,giving information, providing physical care to patients etc. making our patient delighted is our main goal .The great significant part of maintaining excellent patient care are tolerance, understanding, sympathy , and showing concern for the suffering of patients.

Every person has its own important suggestions and different approaches towards patient care but the general opinion would be the same for patient care as, to be positive and optimistic, treat each patient as an individual well human being rather than patient, and provide them with a great care that we provide our ourselves and our family members. Hospital stay is a great exertion and tough stay time. Try out everything that can bring out a patient experience as friendly and delightful. The most significant thing one can do for patient is to stay confident and hopeful. Actually giving them attention when they have pain and dishearten with the whole situation sometimes the patient need to know that someone is there who care for them .They actually know the worth when one remembers their great liking . They really

notice that someone is giving social care and attention to their needs. It is important to create and improve the personnel relationship with patient so that one can modify their approach to make them happy and relax .The very important thing one can do for the patient is just to make smile and use polite and friendly words .Making an interactive positive and full of energy relationship between patient and health care workers is the distinct concept that is predominant in health care now.

II. HOW CAN WE IMPROVE PATIENT CARE?

One of the first and basic principles of facts and methods in hospital organization for good patient care is to take into consider the necessity and desire of patients. One requires to know what is necessary for patients ,what are his/her preferences when it comes to treatment options .All these things are taken conjointly to bring about effective quality of health care for patients. Improving the excellence of the patient care in hospitals is not beneficial for the hospitals or clinics only but it is good for the large section of community as a whole. Improving patient care means reducing suffering, improving patient care has began to be of great significance for all health care centers with a plan to successfully meet patient's expectations. The standard of patient care can be improved by having basic infrastructure such as standardized buildings, power supply, and good quality of training. We can improve patient care by improving by improving health facilities like sufficient amount of medicine supplies and equipments , access to low cost of medicines etc.Also standard quality instruments and technology should be used to improve the quality of patient care services but this must be taken care by suitable maintenance system. Ensure the hospitals to have adequate seating for all patients keep in mind the cancer and elderly patients may have different needs which may need to be fulfilled on time. Make sure the hospital have adequate seating facility to accommodate any of the patient population. Communication in a health care setting is one of the most important tool, we have for providing great patient care. The health care professionals need to have complete, clear and comprehensive communication with them. This will help in reducing the mistakes resulting in improving patient care and health care training for all the staff members from sub ordinates to top authorities must be considered to improve the patient care .Hospital cleanliness decrease the risk of infection and provides a clean and safe environment for our patients .Further it has been seen that waiting hours have a negative impact on patients expectations and health care experiences .Health care organizations can practice a number of plans to make more opd's ,registration counters ,recruiting more staff ,provide good infrastructure .Patient care and health organization are important

unit of construction in the medical care given to our patients .All medical staff should made adequate preparations for better quality of medical care for each individual patients and must provide health aid in any organized and competent way.

III. CONCLUSION

It is important to pay attention towards the every aspect of patient care both medical and non medical.

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The Correlation Between Eye Laterality and Hand Laterality in Unilateral Acquired Anophthalmia Due to Ocular Trauma

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Abstract- Introduction: Ocular trauma is one of the most under-recognized causes of vision loss especially in developing country. Many cases of vision loss due to ocular trauma result anophthalmia. There is complex relationship between visual system and manual motor system, called Eye-hand coordination (EHC). Surgical removal of the eyeball due to ocular trauma is always related to acquired anophthalmia.

Objective: To evaluate the correlation between eye laterality and hand laterality in acquired anophthalmia due to ocular trauma.

This is an analytic study with a cross-sectional approach among 30 patients who have been diagnosed by acquired anophthalmia due to ocular trauma that came to Aceh Tamiang General Hospital, Indonesia from February to June 2020.

Results: From this study, almost all subjects are males 28 patients (93,33%). The most common age group is 21-40 (36,67%). For the eye laterality, right eye is the most common eye of unilateral acquired anophthalmia occurrence due to ocular trauma, 24 patients (80,0%) than the other side. The right-handed patients were dominantly affected ocular trauma (93,33%). All the unilateral acquired anophthalmia cases in this study are due to open globe injury (100%). There is no correlation between eye laterality and hand laterality in unilateral acquired anophthalmia due to ocular trauma (CC=0,132)

Conclusion: There is no correlation between eye laterality and hand laterality in unilateral acquired anophthalmia due to ocular trauma. Dominant hand does not rule out the possibility of ocular trauma at the other side.

Index Terms- Eye laterality, hand laterality, unilateral acquired anophthalmia, ocular trauma

I. INTRODUCTION

Ocular trauma is a leading cause of unilateral blindness and be a particular concern to public health problem due to preventable.(1,2) Only 0,27% of the body surface area is presented the eye, and ocular trauma denote 7% of all body injuries. Eye-hand coordination (EHC) is the complicate relationship between the vision and manual motor system at the crossing between vision and dexterity. EHC is depends on the visual system that directs the hand movement towards an object. By optimal EHC, the movements carried out will be better directed and prevent

undesirable things such ocular trauma. (3,4) The most common serious complication of ocular injury is blindness. The aetiology of ocular trauma differ in urban areas compared to other settings, and differ from country to country, between different regions of the world, and between differing demographic or socioeconomic classes and variations of ocular trauma clinical characteristics must be well evaluated to prevent blindness (5,6). Many cases of ocular trauma are ending with anophthalmia. Anophthalmia is the absence of ocular tissue within the orbit and can affect one or both eyes. Surgical removal of the eyeball due to ocular trauma is always related to acquired anophthalmia. (7,8) Indonesia is a developing country with a large population, and the incidence of blindness due to ocular trauma is still high. This study is motivated by the current lack of data on ocular trauma in Indonesia, especially those resulting in anophthalmia.

II. MATERIAL AND METHODS

This study used an analytic study with a cross-sectional approach. We used total sampling as the sampling technique. All cases of ocular trauma were analyse at Aceh Tamiang General Hospital from February to June 2020. The inclusion criteria were all outpatient and inpatient diagnosed with unilateral acquired anophthalmia after evisceration due to ocular trauma with total sample 30 patients. The exclusion criteria were all patients with the history of ocular and orbital malignancies, and acquired anophthalmia due to other than ocular trauma. This study is to evaluate the eye laterality, age at the time of trauma, sex, hand laterality, type of ocular trauma and the occurrence of acquired anophthalmia due to ocular trauma.

This research has received permission from Health Research Ethical Committee of the Faculty of Medicine, Universitas Sumatera Utara, and also Aceh Tamiang General Hospital has also given permission to conduct research at the hospital. We classified the age (year) into 4 groups: 1-20, 21-40, 41-60, 61-80

Classification of eye trauma adapted from Birmingham eye trauma terminology system (present classification) which classified into two main groups: closed globe injury and open globe injury. In the close globe type, there was no full thickness wound in the eyewall, whereas in the open globe type there was a full thickness wound in the eyewall (cornea and sclera coat)

Statistical analysis

SPSS version 17.0 was used as the application to analyse the data in this study. This study used Pearson Chi-square to conclude whether there is a significant correlation between variables, then in order to evaluate the strength of the correlation between the eye laterality and hand laterality in the occurrence of acquired anophthalmia due to ocular trauma, the authors used the contingency coefficient.

III. RESULTS

A total number of 30 patients meet the criteria in this study. All the subjects are diagnosed as unilateral acquired anophthalmia due to ocular trauma. The eye laterality and hand laterality were evaluated when patients came to the hospital

Tabel 1. Characteristics of subjects with unilateral acquired anophthalmia

Characteristic	n (%)
Sex	
Male	28 (93,33)
Female	2 (6,67)
Age (years)	
1-20	6 (20,00)
21-40	11 (36,67)
41-60	10 (33,33)
61-80	3 (10,00)
Eye laterality	
Right eye	24 (80,0)
Left eye	6 (20,0)
Hand laterality	
Right hand	28 (93,33)
Left hand	2 (6,67)
Type of trauma	
Close globe	0 (0,0)
Open globe	30 (100)

From table 1 based on sex, almost all subjects are males, as many as 28 patients (93,33%). The most common age group is 21-40, as many as 11 patients (36,67%), followed by the age 41-60 (33,33%). The youngest age in this study is 14 and the oldest is 72 years old. For the laterality, right eye is the most common side of the occurrence of unilateral acquired anophthalmia due to ocular

trauma, 24 patients (80,0%) than the other side. The right-handed patients were dominantly affected ocular trauma. All the unilateral acquired anophthalmia cases in this study are due to open globe injury (100%).

Tabel 2 contingency table between hand laterality and unilateral acquired anophthalmia

		Dominant Hand		Total	
		Left-Handed	Right-Handed		
Lateralization Eye	Left eye	% within Dominant Hand	0,0%	21,4%	20,0%
	Right eye	% within Dominant Hand	100,0%	78,6%	80,0%
Total		% within Dominant Hand	100,0%	100,0%	100,0%

Pearson Chi-square = 0,536 ; DF=1; Asymp. Sig. = 0,464
Contingency Coefficient = 0,132

IV. DISCUSSION

Ocular trauma is a scary thing and became a nightmare for the patients, especially when the surgical removal of the eyeball is the last effort that must be done. The anophthalmia provides many negative effects and live changes of the patients. Shame,

unsecured, fear of meeting people, loss of self-confidence, anxiety to depression, stress and emotional instability, fear of become jobless, withdrawing from social life, those are the things that are often experienced by the patients.(9-11) Many studies found that males are commonly got ocular trauma than females.(12-14) Like any other study, in this study we found that male is the most common gender experienced anophthalmia due to ocular trauma

than females. We found that males were about fourteen times more likely to experienced ocular trauma. It probably happened because in Indonesia, most males who work for a living, while females tend to work at home as a housewife. The various published studies on ocular trauma found that young people are particularly vulnerable and have the highest incidence of ocular trauma. (15-17) In this study we also found that the majority group of age 21-40 experienced anophthalmia due to ocular trauma. From this study we found that at the age of 21-40 most males are works as a farmer and construction workers for living. Those kind of job need special skill and safety protective equipment. The ignorance, lack of skill, improper protective equipment are common factors causing ocular trauma, even causes anophthalmia in this study. The right eye is the most common eye experienced with ocular trauma in this study (75%). Many previous studies also said that ocular trauma usually occurs in the right eye.(12).

Eye-hand coordination (EHC), also known as hand-eye coordination is the synchronized control of eye movement with hand movement and the processing of visual input to lead reaching, grasping and doing something along with the use of proprioception of the hands to guide the eyes. Optimal EHC depends on appropriate ocular motor control for high perception of visual acuity and sound manual motor control produce solid effector coaction.(18-20)

The definite mechanism of how the eye laterality and hand laterality may affect the ocular trauma is still unknown. In this study, we also found that statistically, it is not necessarily true that the right-handed patient will develop ocular trauma in the right eye as there is no correlation between right-handed and the occurrence of ocular trauma in the right eye ($cc = 0,132$; $sig = 0,464$). Even though people with right-handed always hold the working instrument using their right hand and when eyes and hands are used to do the main activity, the eyes generally direct the movement of the hand to targets, so if an accident happens during working time, it tends to hit the closest side of the body (dominant side). However it does not rule out the possibility that the accident will injure the other side of the body (eye). Thus, nevertheless most Indonesian people is right-handed due the traditional behaviour that always use the right hand for activities, it does not rule out the possibility of left eye trauma .

In this study, the cause of acquired anophthalmia due to ocular trauma were open globe injury. Untreated or delayed treatment of open globe injury due to the distance to reach the hospital may worsen the prognosis so the surgical eye removal cannot be avoided. The limitation of the study most of the subject who come to the hospital was in the state of severe condition and the patient did not come immediately to seek the treatment, so surgical eye removal is the only alternative procedure.

V. CONCLUSION

Trauma is something that cannot be guaranteed but can be avoided and preventable. The information about the importance of safety protective equipment is needed to prevent ocular trauma especially for the people who live in rural area. Strategies of prevent ocular require proper knowledge of the cause or mechanism of ocular trauma. This study found no significant correlation between eye laterality and hand laterality in unilateral acquired anophthalmic patients due to ocular trauma. By perform

good regulation, eye laterality and hand laterality will not affect the occurrence of ocular trauma.

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Forgiveness among adolescent girls living in shelter home

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Abstract- This study focuses on the level of forgiveness among adolescent girls living in shelter home and those living with parents. Sample comprised of 25 adolescent girls living with parents and 25 adolescent girls living in shelter home, age from 13-19 years. For this purpose The Heartland forgiveness scale (HFS) was used and It was found that the level of forgiveness is high among girls living with parents and low among girls living in government shelter home.

I. INTRODUCTION

Adolescence, transitional phase of growth and [development](#) between [childhood](#) and [adulthood](#). The [World Health Organization](#) (WHO) defines an adolescent as any person between ages 10 and 19.

Erik Erickson (1902-1994) Adolescence is a period of transition from childhood to adulthood which extends from 12-20 years. During this period the individual attains puberty leading to many changes. These changes have enormous implications for the individual's sexual, social, emotional and vocational life; that is why Stanley Hall has rightly described this period as a "period of storm and stress".

These changes make the individual to find an identity, which means developing an understanding of self, the goals one wishes to achieve and the work/occupation role. The individual craves for encouragement and support of caretakers and peer groups. If he is successful he will develop a sense of self or identity, otherwise he will suffer from role confusion/ identity confusion.

A child is not born with values. They are developed through the process of socialization by parents, teachers, society and community. There is a need to make children learn from their foundational years to respect, value, forgive and being thankful for every little thing they are gifted with.

Some are fortunate those who get families to protect them but few are unfortunate who run away from their houses and sometimes their families leave them such children become a part of institutions that provides temporary arrangements for homeless **people** like women, children etc called **shelter home**. The children sometimes run away from their families due to the societal pressure, personality issues, etc and due to personal problems, abuse, negligence, at-risk or abandoned by their families, parents or guardians children are sent to the shelter homes.

[Homelessness](#) is a major issue in [India](#). The [Universal Declaration of Human Rights](#) defines '[homeless](#)' as those who do not live in a regular residence due to lack of adequate housing, safety, and availability. Poverty, unemployment, and lack of affordable housing are commonly recognized causes of

homelessness. These risk factors can be exacerbated by personal vulnerabilities such as [mental and substance use disorders](#), [trauma and violence](#), [domestic violence](#), child marriage, rape, justice-system involvement, sudden serious illness, divorce, death of a partner, and disabilities.

Very often, the home is a space of violence and with this reality, shelter homes are supposed to be the safer alternative available to these adolescents. Adjustment is also a major issue with adolescent who run away from their own homes. Shelter homes provide Child Friendly Atmosphere & Space, Safety & Security, Deal with grievances, etc.

In India, The women and child development ministry had come up with the guidelines drafted by the NGO Child Helpline in 2013 before the Juvenile Justice (Care and Protection of Children) Act, 2015.

Adolescence is a time when a child's unique identity emerges. Until adolescence, a child basically fulfills the will of his parents. However, as an adolescent naturally separates from his parents, he develops his own distinct personality. Forgiveness is the main aspect of their personality.

In this complex stage of life, Forgiveness which has to do with letting go of Grievance, perhaps the most complex of the letting go's. It's difficult for child and parent to journey through [adolescence](#) together without experiencing three needs for forgiveness along the way, each of which can be hard to give and get – forgiveness of others, forgiveness from others, and forgiveness of self.

The study of forgiveness is specifically important in adolescents because this is the period of learning to accept responsibility, let go of things, building healthy conviction, optimistic attitude, better relationships with self and others and fulfilling lives which might make them self-motivated, free from negativity.

Forgiveness is the intentional and voluntary process by which a victim undergoes a change in feelings and attitude regarding an offense, let go of negative emotions such as vengefulness, with an increased ability to wish the offender well. In any event, forgiveness occurs with the victim's full recognition that he or she deserved better treatment, one reason why Mahatma Gandhi contended that "the weak can never forgive. Forgiveness is an attribute of the strong person.

According to Thompson and colleagues, Forgiveness is freeing from a negative attachment to the source that has transgressed against a person. McCullough et al., 1998, forgiveness reflects increase in pro social motivation toward another such that there is - Less desire to avoid the transgressing person and to harm or seek revenge toward that individual, Increased desire to act positively toward the transgressing person.

Robert Enright, defined forgiveness as “ a willingness to abandon ones right to resentment, negative judgment, and indifferent behavior toward who unjustly hurt us, while fostering the undeserved qualities of compassion, generosity, and even love toward him or her” (Enright and freedman, 1998). **Tangney and Colleagues** Tangney model suggests that the giving up of negative emotions is the crux of forgiving process.

Cultivating forgiveness

Forgiving another person- in the most typical category of forgiveness, in this model in which forgiveness is a goal, the first step is to promote a non-distorted, realistic appraisal of the relationship of the two people. The second step is the attempt to facilitate a release from the bond of ruminative, negative affect held toward the violating (transgressing) partner.

Finally the third step is to help the victimized partner lessen his or her desire to punish the transgressing partner. Overtime, forgiveness makes it possible for the hurt and the outpouring of negative feelings to diminish-especially for the victimized partner. Likewise, the treatment enhances the empathy for the transgressing partner, and the therapist tries to make both people feel better about themselves (Gordon & Baucom, 1998).

Forgiving Oneself- A clinician will be alerted to the potential need for forgiveness of the self when a client is feeling either shame or guilt. In this regard, shame reflects an overall sense that “I am a bad person”. As such, same cuts across particular circumstances, and it reflects an all-encompassing view of the self as powerless and worthless.

In contrast, guilt taps a situation- specific negative self-view, for example, “I did a bad thing” (Tangy, Boone, & Dearing, 2005). A person who feels guilt has a sense of remorse and typically regrets something that he or she has done. To correct for such guilt, some sort of reparative action is warranted, such as confessing or apologizing. The process of helping a person to deal with shame is a more difficult one for the helper than is the treatment for guilt. This follows because shame cuts through more situations than the single situational focus of guilt.

Self forgiveness has been defined as “a process of releasing resentment toward oneself for a perceived transgression or wrongdoing” (DeShea & Wahkinney, 2003).

Forgiveness of a situation-Forgiveness should be applied only to people, not to inanimate objects such as tornadoes (Enright, 1998).

Letting go is the part of moving forward so as to have hope in life (Snyder, Lopez et al., 2004)

II. METHOD

Rationale-

Increasing negativity in the present Scenario is taking youths away from a virtuous living. Youth Violence has a serious and lifelong impact on person’s physical, psychological and social functioning (WHO, 2015). The sample selected Adolescence is a time when emerging young adults question their identity. The adolescence are rapidly getting involved in anti-social elements such as rape, theft, murders, etc. therefore there is a need for studying the impact of living environment on pro social behaviors. Keeping all this in view an attempt has been made to investigate impact of living environment on adolescence so as to make them

aware about the benefits of both parental support and virtuous living and to contribute in research done on relationship between living environment and virtues.

III. OBJECTIVES

The objectives of the present study are as follows:-

1. To assess the level of forgiveness among Adolescent girls living with parents as compared to those living in shelter home.
2. To assess the forgiveness among self, others and situation.

Hypothesis-

1. The level of forgiveness will be high among girls living with parents as compared to those living in shelter home.
2. The level of forgiveness of self, others and situation will be high among girls living with parents in comparison to those living in shelter home.

Design-

The design used in the present study was: Descriptive

Sample- Purposive.

A total number of 50 adolescent girls were taken for this study. It was assured that 25 of them had been living in shelter home since five years. Purposive Sampling is also referred to as judgment, selective or subjective sampling is a non-probability sampling, it starts with the purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose.

Tools used-

1. The Heartland forgiveness scale (HFS) was used, first developed in 1998, and the current version was finalized in 1999. It is answered using 7-point rating scale. It is an 18 items trait measure of forgiveness. Items 2, 4, 6, 7, 9, 11, 13, 15, and 17 are reverse-scored. A total forgiveness score is derived by summing the numbers given in response to items 1 through 18 (using the reverse scores for items 2, 4, 6, 7, 9, 11, 13, 15 and 17. There are six items to tap each of the three types of forgiveness- self, other or situation- and respondents use a 7-point rating scale (1= almost always false of me to 7= almost always true of me). Scores on HFS have correlated positively with scores on other forgiveness measures; people scoring higher on HFS also show more flexibility and trust, as well as hostility, rumination, and depression. Designed to assess person’s dispositional forgiveness. Can be completed with paper and pencil or computer. Convergent validity and satisfactory internal consistency reliability. Strong test-retest reliability.

IV. RESULTS AND INTERPRETATION

Table 1: Showing descriptive statistics of variable, forgiveness.

variable	Number of items	Scale range	Scale mean	Obtained range		Obtained mean		Obtained S.D.	
				Girls living with parents	Girls living in Shelter Home	Girls living with parents	Girls living in Shelter Home	Girls living with parents	Girls living in Shelter Home
Forgiveness	18	18 - 126	72	72-92	61-82	82.00	71.50	6.27	4.21

The number of items in the scale used for assessing forgiveness was 18. The scale range was 18 as minimum and 126 as maximum on that mean. Therefore the scale mean was 72. The obtained range was 72 and 61 as minimum and 92 and 82 as maximum therefore the obtained mean was 82 and 71.50.

Since the obtained mean is much higher than the scale mean, this shows that the level of forgiveness is high among girls living with parents and hence the first hypothesis that the level of forgiveness will be high among girls living with parents as compared to those living in shelter home has been proved.

As there are six items to tap each of the three types of forgiveness- self, other, or situation-and respondents use the seven-point scale (1-Almost always false of me to 7-almost always true of me), scores on the HFS have correlated positively with scores on other forgiveness measures; people scoring higher on the HFS also show more flexibility and trust, as well as less hostility, rumination, and depression.

The hypothesis made in this regard that the level of forgiveness of self, others and situation will be high among girls living with parents has been proved, when the scores of the three domains- the forgiveness of self, others and situation were calculated it was found the level of forgiveness is high in all the domains of girls living with parents as compared to those living in shelter homes.

It is also stated in the studies that- Forgiveness of others and forgiveness of self have been associated with less depression (Lawler et al., 2005; Toussaint, Williams, Musick, and Everson-Rose, 2008), stress (Berry & Worthington, 2001), and anxiety (Subskoviak et al., 1995), as well as increased physical health (Lawler-Row, Karremans, Scott, Edlis-Matityahou, & Edwards, 2008), life satisfaction (Karremans, Van Lange, Ouwkerk, & Kluwer, 2003), and hope (Rye et al., 2001).

And girls living with parents were found more happy and satisfied with their lives.

95 British families (mothers, fathers, and their 12- to 16-year-old children) completed questionnaires about their forgiveness twice over the course of a year. The findings, Parents who were more forgiving *toward* their children at the start of the year tended to receive greater forgiveness *from* their children at the end of the year.

“This finding supports the notion that children learn forgiveness behavior modeled by their parents,” Maio and his colleagues explained. Therefore the hypothesis made in this regard that, “The level of forgiveness will be high among girls living with parents” is accepted.

Table 2: Showing mean and t-value of Forgiveness

	Mean		Combined S.D.	S.E.D	t-value	Interpretation
	Girls living with parents	Girls living in Shelter Home				
Forgiveness	84.08	78.76	5.46	1.53	3.48**	significant

- ✓ Value on 45 df is 0.05 level is 2.02 and 0.01 is 2.69
- ✓ Value on 50 df is 0.05 level is 2.01 and 0.01 is 2.68

The t- Value of Forgiveness 3.48** is significant at both the levels.

Table 2 depicts the significance of the mean differences in various variables between girls living with parents and girls living in shelter home t-testing was done between the score of girls living with parents and the girls living in shelter home. The mean score of girls who are living with parents is found to be 84.08 and for girls who are living in shelter home it is found 78.76. It shows that the girls living with parents has higher mean. S.D value is 5.46 and S.E.D value is .1.53. After that t-value was calculated that is 3.48. It is checked on 45 and 50, it is significant on both the level 0.05 and 0.01. It shows that the girls who are living with parents are more likely to forgive others more than the girls who are living in shelter home. This result can be further supported by the studies of –

- Hope, 1987; Maio et al., 2008; McCullough & Worthington, 1994 found that forgiveness is considered important in the successful maintenance of relationships (Hodgson & Wertheim, 2007), especially during the ruptures caused by transgressions and hurts.
- (Fincham & Beach, 2002) found that the process of forgiving others has been shown to enhance the relationships of intimate couples, families, communities, and nations (Enright & Fitzgibbons, 2000).
- Homelessness is one of the most pressing social problems today. Society has responded to the problem with the creation of homeless shelters. Yet, the nature of the operation of the shelter is not defined. This study explored the operations of two single adult homeless shelters to understand how they operate in addressing the problem of homelessness. The study identified two different types of services, one called “house” and the other “home.” House services provided basic food, shelter, and linkage to social services, which fulfilled the basic definition of the problem of homelessness as

defined by the Institute of Medicine. Home services provided the basic services of house but also went one step beyond by providing these services within the context of a supportive environment, thus creating informal social supports. The study discusses the implications of each of these modalities in addressing the problems associated with people who are homeless as well as the differences in policies and structures which contribute to one shelter providing house and the other home services.- [Journal of Social Distress and the Homeless](#), Bruce D. Friedman

- As no studies have been done in Indian setting regarding this topic it can be said that the following result is due to-
 - The girls of shelter home are not fortunate to live in the friendly and co-operative atmosphere whereas girls living with parents have access to it.
 - The Caregivers of Shelter home are not sensitive enough to fulfill the basic needs of girls living there and they lack sense of understanding towards them.

V. SUMMARY AND CONCLUSION

The purpose of present study was to explore Forgiveness and its importance in adolescent years. It is specifically important in adolescents because this is the period of learning to accept responsibility, building healthy conviction, optimistic attitude, better relationships and fulfilling lives which might make them self-motivated, ambitious, open to new opportunities challenges and empower their performance in various pursuits of life and learning forgiveness for self, others and situation will enrich this feeling. In Today's modern world, the blind race for money, power and success is leading young people adopt wrong path in the course of accomplishment of their goals (Ahmad & Siddiqui, 2009). The young adults are rapidly getting involved in anti-social elements such as rape, theft, murders, etc. therefore there is a need for studying the impact of living environment on pro social behavior.

The scholar with the longest track record in studying forgiveness is Robert Enright, who defined forgiveness as "a willingness to abandon ones right to resentment, negative judgment, and indifferent behavior toward who unjustly hurt us, while fostering the undeserved qualities of compassion, generosity, and even love toward him or her" (Enright and freedman, 1998)

It is crucial to that the forgiving person develop a benevolent stance towards the transgressing person. As he puts it as "the fruition of forgiveness is entering into loving community with others" (Enright & Zell, 1989).

It was an interesting experience to gain the knowledge about adolescence, their issues and challenges and interact with adolescent girls specially those living in shelter home and it was seen that there is a needs to work on enhancing the feeling of forgiveness as it enhances the well-being of a person. There is a need to inculcate and enhance feeling of forgiveness among them as from childhood they are taught to be rational and responsible and successful. To forgive others and move forward in life is very important because one cannot carry over his or her past as it is very difficult and causes harm to their personality as well as life goals are not achieved. There is a need to work on it effectively. There is also a need to sensitize the staff members of shelter home.

VI. IMPLICATIONS

Such types of studies are the needs of the hour. There is a need from childhood that the child be taught to "to forgive self, others and the situation". Results of the study cannot be generalized as the sample size is very small. For the generalization of the result large sample size can be taken. Data collection through psychometric devices in this study can be supplemented with qualitative data. It can also gain through interview technique. Limited variables are undertaken in this study, so more variables can be undertaken to enrich the data. The study can also be done to explore the gender differences using other variables.

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Assessing the Interface between Military Diplomatic Tools and Military Intervention in Intrastate Conflicts in the Horn of Africa

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Abstract- Military diplomacy is increasingly emerging as an approach in the management of intra state conflicts globally. Far more common and controversial is the issue of combat troops to help end fighting in an intractable conflict. The Horn of Africa represents a classic example of a region that has witnessed many conflicts attracting several international, regional and even individual state initiatives to ameliorate the situation. The Somalia and Sudan crises provide typical examples in which such efforts have been witnessed yet they also provide a case study of successful military diplomacy by African states in states engaged in protracted intra-state conflicts. This study was conceived to assess the interface between military diplomacy tools and military intervention in intrastate conflicts in the Horn of Africa. This study was juxtaposed in just war theory. The study was carried out among peace groups and individuals who had participated in peace processes in the Horn of Africa. Personnel who have had a role in the Horn of Africa peace processes at African Union (AU), Inter - Governmental Authority on Development (IGAD), East Africa Standby Force (EASF), United Nations Mission in South Sudan (UNMISS), United Nations Africa (Union) Mission in Darfur (UNAMID) and African (Union) Mission in Somalia (AMISOM) were key informants. The study used purposive sampling and snowballing to determine the sample size. Data was collected using interview schedules and questionnaires which were analyzed using Concurrent Nested (Embedded) Design. Secondary data was gathered and reviewed from Journals, books and published proceedings that corroborated the primary data. Drawing a nexus between soft power and hard power in diplomatic efforts, this study makes a contribution to peace and conflict studies based on the interface between the two instruments of power: military and diplomacy. There is an interface between military diplomatic tools and military intervention in conflicts. The study found out that arms transfer was the most common diplomatic program used by the military, in contrast weapons shipments increase the duration and hostility levels and make the termination of civil conflicts less likely. These efforts are complemented by compensatory interventions including peacekeeping military, humanitarian agencies and NGOs functions which provide the necessary assistance, not only towards the Disarmament, Demobilization and Reintegration (DDR) programme, but also enhancing local and national capacities through active engagement, consultation and

participation in the planning and implementation of the programme. It is recommended that the 'carpenter's tool box' model be adopted in which every item in the tool box has a specific role to play in conflict management and, therefore, it is the complementarity of the efforts between the military, police, civilian components and entirety of society that will lead to conflict management in the Horn of Africa.

I. INTRODUCTION

Military intervention in conflict theatres has been focused on the condign strategies to the detriment of soft power tools including compensatory and conditioning power tools. These are tools derived from the analysis of the exercise of power as advanced by John Kenneth Galbraith and whose relevance can be juxtaposed in the use of military diplomatic tools. According to Galbraith (1989) there are three military diplomacy power tools. The first is condign power which refers to winning submission by making the alternative to submission sufficiently painful. The second is compensatory which involves use of rewards or payments sufficiently advantageous or agreeable so that one foregoes pursuit of one's own preferences to seek the reward instead. Finally, Conditioning power is exercised by changing belief through persuasion, education or social commitment to what seems natural, proper or right.

The linkage, therefore, between military practice and diplomacy can be traced back to centuries past. From the earliest recorded days of warfare, military theorists and practitioners, revealed the relationships of these elements and the need to coordinate them to realize maximum efficiency. If this coordination could be well knit in the Horn of Africa then the management of intra state conflicts in the region could be realized. Historically, militaries have been associated with the use of force to achieve the desired political objectives. Despite of this, there have been numerous instances where military diplomacy has been used for peace so as to further the country's international relations. In his writings on *Offensive Strategy*, Sun Tzu asserts that for to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill (Sun Tzu, 1968). What the military thinker meant was that attaining several victories, whatever the number, in one hundred battles is not the pinnacle of excellence but subjugating the enemy

army without fighting or firing a single round is the true pinnacle of excellence or victory.

The emphasis Sun Tzu places on the use of skill as opposed to force is apparent from the foregoing. Further, he writes about managing the battle environment in order to influence future outcomes, which he sees as the essence of military diplomacy (Sun Tzu, 1968). It would be interesting to unravel the way military skill has been used in the resolution of intrastate conflicts in the Horn of Africa thus interfacing military diplomatic tools with military intervention in intrastate conflict management.

Johnson and Hall (2005) note some positive attitudes with regard to diplomacy among the English School scholars, where it assumes the role of an institution structuring relations among politics (not states) and even elicits the highest level of abstraction in a dualism of mediation of universalism and particularism. Alongside this positive trait, they also cite diplomatic repertoire especially with regard to the aspects of communication and representation which can be described as the hallmark of diplomacy; that is, to moderate and manage the clash of conflicting interests as efficiently as possible.

II. LITERATURE REVIEW

The conflicts in the Horn of Africa have witnessed a lot of international attention with growing number of military bases. In fact, this is akin to militarization of the entire Horn of Africa. In this context, third party involvement in the form of facilitative mediation, problem solving workshops, training in conflict resolution and post conflict rehabilitation, are the tools available for international actors. These initiatives require a non-partisan third party role in the conflicts and are designed to deal with trust and perception related matters that cripple relationships (McDonald, 2004).

Military diplomacy as a concept has gained relevance considering that diplomacy has experienced a significant transformation particularly in the last decades of the 20th century. Military diplomacy performs several functions including a strong commitment to economic investment in the future of disparate regions to enhance partnerships within those regions. It equally helps to generate sustained diplomatic efforts, with military diplomacy taking the centre stage in a region held hostage by conflict (Healy, 2008). Specific reference has been made to the erosion of the barrier of sovereignty which has cushioned states against interference in their internal affairs by other states and non-state actors (Migue, 2014). It is contextualized not only within the realm of defense diplomacy, but also within the wider framework of a country's diplomacy as exemplified in the foreign policy. It can also be considered as one of the tools of a country's diplomatic practice in furtherance of its foreign policy objectives.

The linkage, therefore, between military practice and diplomacy can be traced back to centuries past. From the earliest recorded days of warfare, military theorists and practitioners, revealed the relationships of these elements and the need to coordinate them to realize maximum efficiency. If this coordination could be well knit in the Horn of Africa then the management of intra state conflicts in the region could be realized. Reputed theorists and practitioners include; Sun Tzu, Fredrick the Great, Carl Von Clausewitz, and Alfred Thayer Mayer (Williard, 2008).

Philips (1985) notes the vital relationship between military activities and diplomatic activities as integrated tools in a nation's pool of power. While he practiced formal diplomacy extensively, he emphasized the importance of public and military diplomacy. Further, he underscored the need to appreciate the environment within which his generals operated in by making visits to study the country where you are going to act, roads are examined, and the mayors of the village, the butchers, and farmers are talked to. Clausewitz (1968), like Sun Tzu, emphasized the ability of a great commander achieving an end state through varied means of influence. At one level he talks of the soldier statesman whom he sees as the cornerstone of modern military diplomacy. The role of a soldier is first that of a fighter and also that of a statesman who deals with issues of policy. He, therefore, draws the important linkage of military activities to those of policy. He advocates the need to synchronize military capabilities with other tools of policy implementation for the desired effects (Clausewitz, 1968). This study examined whether such military activities have been harmonized with those of policy in an attempt to manage intrastate conflicts in the Horn of Africa.

The multi-faceted nature of security threats has challenged the strategic posture of states. New emerging security interests have therefore opened a wide array of concerns that include and not limited to: food security, population control and even issues of environment. In this rapidly changing environment, there are security implications for diplomacy that are complex and evolving. Security can therefore be viewed as the pursuit of policies through diplomatic and military means to confront such external threats as; regime maintenance, the attainment of a reasonable level of economic sustenance, ethnic cohesion, trans-boundary sources of instability and access to natural resources. At another level, the UN financial crisis and global politics has diminished the linkages between diplomacy (military) and peacekeeping. This has resulted in hampered peacekeeping operations, some of which have been withdrawn or have not received desired expanded support at critical moments. Examples are given in Somalia and Bosnia. At the regional level, African states have found it difficult to establish viable security arrangements. This was particularly evident during the Organization of African Unity's (OAU) era whose preoccupation was mainly in the political and economic arena. The case of the African Union (AU) has not significantly changed the status of regional security arrangements in spite of the establishment of the African Peace and Security Architecture (APSA).

A study by Bademosi (2012) investigated the ethical dilemmas of Kenyan military intervention in Somalia. The case study targeted international governmental organizations, state security departments and NGOs relying on interviews and document analysis. Bademosi employed the just war theory as a vehicle to analyze the morality of the Kenyan intervention in Somalia. The study found out that the role of non-state actors in Somalia is significant because the government has been more or less absent in the last several decades. It concluded that engaging more moderate Muslims and including them in their intervention can offer a long-term strategy to countering terrorism in Somalia (Bademosi, 2012). The study recommended the need for Kenya to capitalize on various forms of nontraditional diplomacy efforts for example non-traditional diplomatic tools like faith-based diplomacy to engage stakeholders, towards Somalia. Military

diplomacy is also another non-traditional diplomatic tool to find relevance in the Horn of Africa.

In the theory of Sea Power, Mohani (2012), demonstrates the means of achieving a variety of goals be they, informational, diplomatic, military and economic through what he calls maritime military diplomacy. The use of maritime power has also been referred to as Gunboat Diplomacy. The author, therefore, saw the maintenance of a naval fleet as a prerequisite to the advancement of economic interests by means of sheer presence. Gunboat diplomacy has therefore been described as the application of sea based power resources in the furtherance of national interests. This application can be either in the high seas or within the jurisdiction of a foreign state. The concept of gunboat diplomacy traces its origin to the period of colonialism at the height of European imperialism. The European powers used demonstration of superior maritime military power to intimidate states into offering them concessions. Indeed, the sight of a warship or fleet elicited the desired response (Mohani, 2012). Although some maritime strategists associate gunboat diplomacy with yesteryears of colonialism, it has significance in the contemporary age. For example, the employment of the KDF's maritime military resources (Kenya Navy) both within Kenya's Coastal waters and that of Somalia, demonstrated military diplomacy and whether this portended any condign or compensatory power in influencing intra state conflict management in the Horn of Africa was the focus of this study.

III. THE JUST WAR THEORY

In an attempt to understand the interface between diplomacy and military intervention in intrastate conflict management in the Horn of Africa, the study was guided by the just war theory as propagated by among others, St. Augustine, Michael Walzer and Bellamy. Just war theory offers rules to guide decision-makers on the appropriateness of their conduct during the resort to war, conduct during war, the termination phase of the conflict and the post war settlement and reconstruction. Its over-all aim is to try and ensure that wars are begun only for a very narrow set of truly defensible reasons, that when wars break out, they are fought in a responsibly controlled and targeted manner, and that the parties to the dispute bring their war to an end in a speedy and responsible fashion that respects the requirements of justice. These guide military intervention.

The main argument behind the just war theory is the ethical arguments about the resort to and conduct of war. According to St. Augustine, waging war and extending influence over other territories may seem justified to wicked men, but to good men it is seen only as a necessary evil. However, according to Dyson (1998), although war is bad, it is necessary if it prevents a greater harm. According to Walzer (1977), just war theory broken into its two main categories tries to dictate the justification for going to war (*jus ad bellum*) and once engaged, the conduct of the combatants involved (*jus in bello*) (Walzer 1977). The interesting question is then; When is war morally acceptable (*jus ad bellum*)? And how can morality be observed by combatants (*jus in bello*)? *Jus in bello* refers to justice in war, or right conduct in the midst of battle. Responsibility for state adherence to *jus in bello* norms falls primarily on the shoulders of those military commanders, officers and soldiers who formulate and execute the war policy of

a particular state which involves a lot of military diplomacy in their interaction.

Bellamy (2012) argues that natural law is grounded in moral reasoning. It holds that proper behavior is governed by precepts that can be known by reason and are binding on all rational beings. Chief among these precepts is that natural rights accrue to people simply by virtue of their being human (Bell and Coicoud). Natural law recognizes the right and, according to some thinkers, the duty of sovereigns to use force to uphold the good of the human community, particularly in cases where unjust injury is inflicted on innocents. This is very valid in application of military diplomacy in the Horn of Africa particularly the use of condign power and military interventions. Just war theory is probably the most influential perspective on the ethics of war and peace. The tradition has thus been doubly influential, dominating both moral and legal discourse surrounding war. It sets the tone, and the parameters, for the great debate surrounding the concept of military diplomacy.

IV. METHODOLOGY

The study area is the Horn of Africa (HOA); The HOA is a large extension of land that protrudes from the eastern edge of the continent of Africa lying between the Indian Ocean to the East and the Gulf of Aden to the North jutting for hundreds of kilometers into the Arabian Sea including Ethiopia, Eritrea, Djibouti, Kenya, Somalia, Sudan and Uganda which are members of (IGAD).

The Horn of Africa is a location of strategic importance globally since it is a gateway from and to the Red Sea, Gulf of Aden, Arab Gulf and the Indian Ocean. It is also the continent's gateway to Asia and Middle East with deep historical ties to India and China who present themselves as powerhouses in trade and investment deals. The peace, security and stability of the region therefore is paramount not only to Africa as a continent but also to the Arab countries and the West (Fahmy, 2006).

This study employed a mixed methods design covering the target regions including Kenya (Nairobi), Somalia (Mogadishu and Kismayu), Sudan (Khartoum), South Sudan (Juba) and Ethiopia (Addis Ababa). The total sample size for the study was 270. The specific respondents for study included; state actors (Foreign Affairs, Horn of Africa Troop Contributing Countries (TCCs), Ministry of Defense, Kenya, Sudan and Somalia Embassies, Non state actors (Media houses, Non- Governmental Organizations (NGOs), Community Based Organizations (CBOs), Civil society) and religious institutions. The researcher considered them relevant for study because they had experience with the central phenomenon of military diplomacy and intra state conflict management. The study used both probability and nonprobability sampling techniques; and utilized simple random sampling technique and purposive sampling to determine the settings and the participants. The data was collected using questionnaires, interview guides and Focus Group Discussion (FGD) guides. Secondary data was sourced from reading literature in secondary sources.

V. RESULTS AND DISCUSSIONS.

The field study endeavoured to elicit responses from key informants who had versed knowledge in conflict management and had either practiced or participated in the Somalia and/or Sudan conflict(s) to explain the nexus between military and non-military tools. This was nested with 270 questionnaires distributed across the areas of study. This is also supported by documentary analysis. One key informant interviewed in Nairobi on 18 June 2018 likened the nexus between the use of military and non-military tools in conflict management to a carpenter’s tool box: In conflict the tools you choose can be likened to a carpenter’s tool box where the choice of a tool to be used depends on the task ahead, you cannot choose a hacksaw to deal with a nail instead you use a hammer and so forth....

From the foregoing, as a foreign policy action, diplomacy entails the process through which a given state employs political, social and economic means at its disposal across recognized boundaries aimed at affecting the political authorities of the target. Therefore the concept of the ‘Carpenters Tool Box’ in conflict management is in agreement with reviewed literature of Mohani (2012) that while diplomacy is the first line of defence among states, military is the last one and involves the use of force especially what this study has discussed extensively as condign power. Therefore there is vital relationship between military activities and diplomatic activities as integrated tools in a nation’s pool of power, which is well postulated in the just war theory which requires the use of military power as a last resort. The integrated use of a nation’s pool of power is demonstrated in scholarly works of people like Sun Tzu (1968) who wrote that to fight and win a thousand wars is not the acme of skill but to subdue the enemy is the acme of skill.

Militarized diplomacy as a foreign policy action in the Horn of Africa has been a salient national security feature, regionally, sub-regionally and internationally in lieu of the escalation of intrastate conflict, often in a protracted nature, in the region. In this regard, the desired end of military diplomacy is to shore up or replace existing structures, assist embattled civilian populations and/or to shore up structures thought to be in danger of collapse. The interface starts from the structuring of the Peace Support Operations with the best example being the interface within the

AMISOM structure as alluded to by one military officer interviewed in Mogadishu on 14 December 2018:

When you talk about AMISOM as a peace support operation, it is not about the military alone but there are other components like the police and civilians whose role is very clear as stipulated in the mandate...

From documentary analysis of AMISOM Standing Operating Procedures (AMISOM SOP, 2007), it suffices to note that in combined civilian and military AU Peace Missions, the overall political direction and control of the activities of the mission and consultations with other organizations and agencies in the field is normally exercised and coordinated by an AU Special Representative of the Chairperson of the Commission for Somalia (SRCC) as such all Heads of major components (Military, Police and Civilian) report to the SRCC. In this arrangement the Head of Mission is provided with legal and political advisors, with a civilian administrative staff as necessary (AMISOM SOP, 2007). The UNAMID and UNMIS setups each have the Special Representative of the Secretary General of the UN Security Council. The two missions have similar configurations of military, police and civilian components, for example, while the military components focus would be military operations and civil military coordination, the police would bolster up internal security and address human rights issues.

It is therefore clear that there is a clear interface between non- military tools and military tools whose application, the choice of whose just like in the carpenter’s tool box, entirely depends on demand of the mission for example, as earlier intimated while the military component’s focus is on military operations and civil military coordination the police would bolster internal security and address human rights issues.

VI. PROGRAMMES USED BY THE MILITARY

The study sought to elicit from the respondents the programs used by the military in intrastate conflict management in the Horn of Africa. The respondents mentioned arms transfer, exchange programmes for military staff and finally Disarmament, Demobilization and Reintegration Programmes as indicated in Table 2.

Table 2: Programmes used by the Military

Ser	Programme	Responses out of 270	Percentage
1.	Arms Transfer	139	51.4
2.	Exchange Programmes	48	17.8
3.	DDR	30	8
4.	Intervention (PSOs)	63	23.5

Source: Field Data, 2019

Some of the most known military popular programmes used in intra-state conflict management as provided by the respondents included, arms transfer was mentioned 139 times (51.4 %), Peace

Support Operations 63 times (23.5%), Exchange Programmes for military Staff was mentioned 28 times (17.8%) and DDR 30 times (8%). These findings are in tandem with Kinsella (1998), who

agrees that there are a number of programmes used by the military in intra state conflict. These percentages based on the responses were weighted in this cluster to a total of 100%. The results indicate the level of impact each of the programmes had according to the respondents in intra state conflict management. For example DDR programmes are very elaborate but their impact is still minimal because there are small arms and light weapons in the hands of so many locals in Somalia and Sudan.

The findings show that 51.4% of the respondents felt that arms transfer was the most common diplomatic program used by the military. Yet Disarmament, Demobilization, and Reintegration ranked very low at 8%. One military officer interviewed in Mogadishu on 14 December 2018 provided an explanation:

In the entire Sudan and Somalia, DDR programmes appear not effective because there are so many weapons in the hands of civilians because they feel they would be insecure if they released their weapons...

It emerged from the respondents that the issue of arms and motivation to disarm and demobilize has been used by combatants as a means to cajole the respective governments for compensation. They turn it into a compensatory power tool to trade with the governments as if they are selling the weapons for money.

Some of the militarized conflict resolution programmes that were most commonly mentioned included Disarmament, Demobilization, Reinsertion and Reintegration (DDRR) and arms transfer were mostly employed through condign military tools. This is in contrast to peace support operations and exchange programs for military staff which mostly use compensatory and conditioning tools. This sentiments are shared by Adekanye (1997) who has reviewed demilitarization and reconstruction processes in post-conflict societies in Somalia (UNOSOM & United Nations International Task Force - UNITAF), Rhodesia/Zimbabwe, the former Yugoslavia (United Nations Protection Force - UNPROFOR), Cambodia (UNTAC) and Mozambique (ONUMOZ), in his reviews he argues that managing arms is only one aspect of a peace process yet this remains a challenge in the use of military diplomacy in the Horn of Africa.

VII. ARMS TRANSFER

According to the findings arms transfer scoring 51.4% is a relatively effective programme in intra state conflict management in agreement with Kinsella (1998) who postulates that, as a transfer of military capability, weapons shipments increase the tendency of the recipient to strike a conflictual posture in its foreign policy, while arms transfer dependence restrains that tendency. With regards to this issue an opinion was brought up by one of the respondents who was interviewed in Juba in October 2018:

...you cannot be comfortable with guns in the hands of almost the entire population.....it's like domiciling a snake, you will never sleep easy...

Yet guns are a common feature in both Somalia and Sudan. In the two conflict areas, despite the finding that arms transfer is the most effective, are still awash with small arms and light weapons. One respondent interviewed in Mogadishu on 15 December 2018 explained that because of the availability they are so cheap. He said:

...while in my village (name withheld), a rifle is exchanged for 30 cattle worth equivalent of 200 US dollars each, in Somalia a rifle can be bought for 50 US Dollars.

This then requires a mop up exercise which would require military diplomacy through serious and elaborate DDR programmes yet from the findings it is very clear that the effectiveness of DDR programmes in the Horn of Africa conflict countries is still ranked very low at 8% compared to the other programmes.

Kinsella (1998) further argues that an arms recipient faces the possibility that weapons shipments will be truncated during periods of regional crisis and hostility. The same is true in regard to when a state is dependent on one or a few major suppliers for the bulk of its imported weaponry as it serves to have the costs associated with supply restrictions increased. This encourages restraint on the part of states which would have otherwise been emboldened by arms acquisitions. For some states, Kinsella (1998) argues, there is evidence that arms shipments encourages more conflictual foreign policies; but there is also evidence that this propensity was tempered by the degree of arms transfer dependence (Kinsella, 1998). This collaborates UNSC Resolution 2472 emphasizing the ban on sale of charcoal in Somalia and placing the reinforcement of this mandate on AMISOM. On this an AMISOM official remarked:

Indeed the issue of charcoal and the Somali conflict goes beyond meet the eyes... charcoal fuels the conflict because it is well known that charcoal leaves the Port city of Kismayu in small boats and is offloaded in turns onto waiting ships in the deep seas...sometimes it is in exchange of arms.

This is a clear indication that as much as arms transfer fuels conflicts to others it is an economic source and this explains why the Horn of Africa conflict zones are still awash with weapons despite international efforts through embargoes and even deliberate military interventions in the conflict zones.

It was evident that the three significant military diplomacy power tools were; condign power, compensatory power and conditioning power. It was therefore of interest to place the military programmes within the context of the military diplomacy power tools which occasioned responses as indicated in Figure 3.

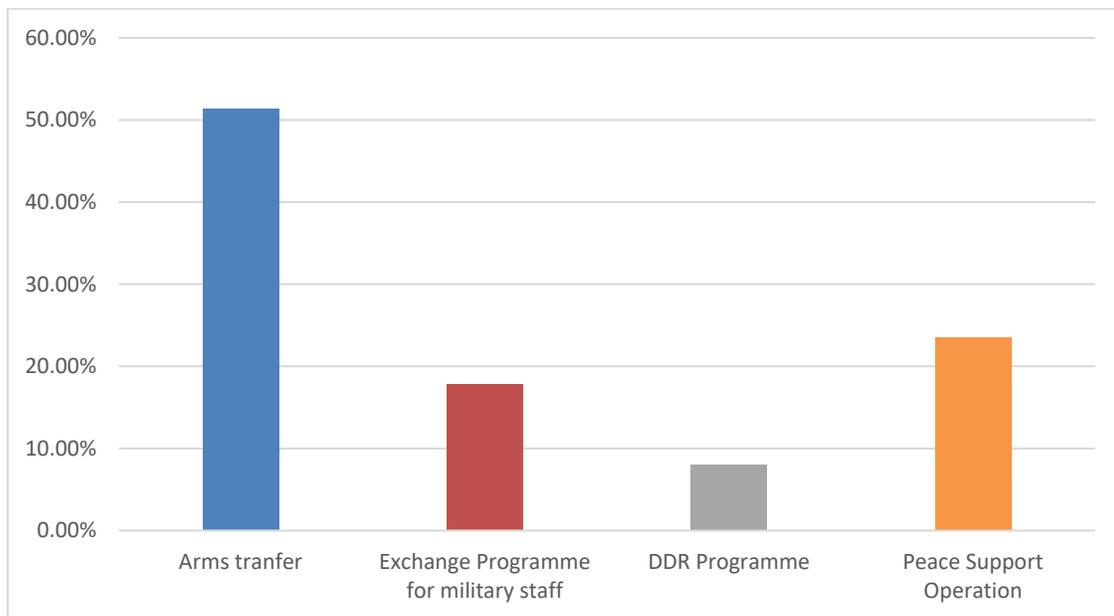


Figure 3: Military Programmes in Military Diplomacy Power Tools
Source: Field Data, 2018

1. Disarmament, Demobilization and Reintegration Programmes

According to Knight and Ozerdem (2004), the process of disarmament, demobilization, reinsertion and reintegration (DDRR) of former combatants plays a critical role in transitions from war to peace. The success or failure of this endeavor, Knight and Ozerdem (2004) further argue, directly affects the long-term peace building prospects for any post conflict society. The two scholars explore the closely interwoven relationship between peace building and the DDRR process in order to present an assessment of various disarmament, demobilization and Reintegration (DDR) programmes planned or implemented in a number of countries over the last two decades (Knight & Ozerdem, 2004).

Knight and Ozerdem (2004) question whether there is a need for a more comprehensive consideration of disarmament by acknowledging and responding to its social, economic and political implications. In this regard, the two scholars see disarmament in terms of a social contract is proposed as an alternative to the current military-centred approach (Knight & Ozerdem, 2004).

Post-conflict peace-building in many areas have been undermined by the high level of armaments that continues to create instability, even after negotiated peace agreements. Programmes to reduce the levels of these destabilizing arms followed by long-term arrangements to demobilize and reintegrate combatants into civil society through economically viable alternative lifestyles accompanied by post-conflict reconstruction and development therefore promise a more permanent end-state of peace and stability.

According to regional Economic Communities, regional countries, NGOs, civil society organizations and the international community have a very important role in DDR activities, particularly in the reconciliation and peace-building process, as well as mobilizing or providing financial and logistical support. Given the diversity of actors involved in various stages and aspects

of DDR, planning is to be done in an integrated multidisciplinary manner.

The peacekeeping military and humanitarian agencies and NGOs functions are therefore complimentary in providing the necessary assistance, not only towards the DDR programme, but also enhancing local and national capacities through active engagement, consultation and participation in the planning and implementation of the programmes. The entirety of these processes is what underscores the concept of military diplomacy particularly considering the interface between diplomatic tools and military tools. A respondent at the AU PSC interviewed in Addis Ababa on 15 January 2019 remarked:

The relationship between diplomatic and military tools in a Peace Support Environment is that one of one emanating from the other... the civilian needs the military for protection and the military need the civilian to play the administrative and political process

The DDR functions are principally the responsibility of the civil authority, normally, with the support of civil society organizations and the international community, within the framework of post-conflict peace-building measures but having a military face, arms control requires a military engagement. The combined active participation in the planning and implementation of the programmes provides for the inevitable aid packages that relate directly to the immediate bread and butter needs, as well as shelter, tools, transportation, education and vocational training, of the ex-combatants. This takes cognizance of the just war theory stipulating the manner in which ex-combatants including Prisoners of War (POWs) should be treated in conflict.

To add synergy, the vocational training projects for provision of employment and socioeconomic livelihoods and for poverty alleviation should integrate demobilized combatants and the civilian population, including returning refugees and Internally Displaced Persons - IDPs to facilitate national reconciliation, reunification and rehabilitation. (AMISOM SOP, 2007)

2. Demilitarization

Demilitarization is a prerequisite for the successful establishment of a safe area, buffer zone or DMZ, but not necessarily for a TSZ. Asked to explain what entails demilitarization, an Officer interviewed in Juba on 15 October 2018 explained that Demilitarization includes; disarming of all combatants who are non-AU or non-UN personnel to include weapons, ammunition and communication equipment. This also extends to infrastructure where it involves dissolving any military structure or organization in the area, handing in of all military or military type uniforms and clothing and withdrawal of any military force from one senior respondent this can be: ...outside the area to a distance at least farther than the range of most small arms (at least 1.5kms), or if agreed, beyond conventional artillery range (2.530kms).

According to the AMISOM Standard Operating Procedure document obtained at AMISOM headquarters in Mogadishu, thorough demilitarization can be achieved only if the party that is to demilitarize is satisfied that one of the two following conditions are met; units of elements of the peacekeeping mission protecting the area has the mandate, the means and the will physically to

protect the area and/or the terms of disarmament allow the disarming party to ream and mobilize with sufficient speed to counter a hostile force (AMISOM SOP, 2007). The respondent further explained that if one of these conditions is not met, it must be expected that the party that is to disarm will in all likelihood go underground with a substantial part of its war fighting capability, and this has remained a disturbing challenge to conflict management in the Horn of Africa.

VIII. MILITARY INTERVENTION AS A TOOL

According to Crocker (1996), states generally decide on how to entrench military diplomacy in their foreign policy. From the findings of this study the motivation for military intervention is three-fold namely, the intervening nation's own capabilities and connection to the conflict (what corresponds to this studies responses on a scale of 100% about national interests accounting for (162) 60%); secondly, the status and ripeness of the conflict for resolution (accounting for a distant (27)10%); thirdly, the characters of the parties and their decision-making systems (54) 20% and others accounting for (10) 10% as depicted in Figure 4.

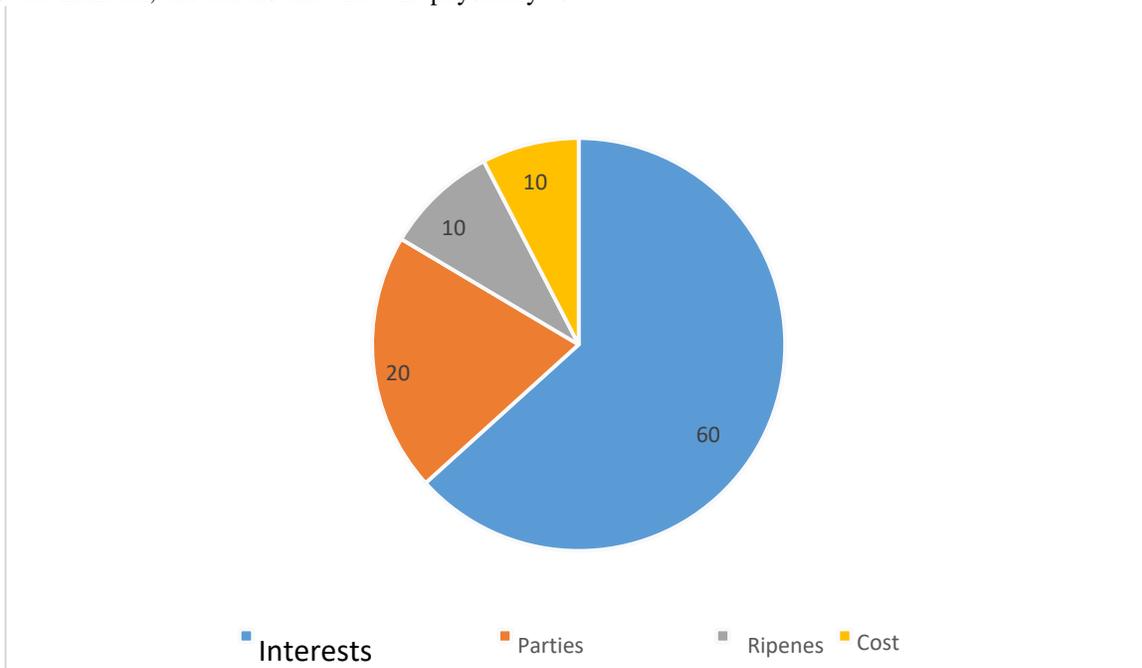


Figure 4: Intervention as a Tool
Source: Field Data, 2018

It is true that the respondents responses on other factors are in line with what Crocker (1996) also advocates for a closer attention on a fourth factor which he says is overly glossed over but should on the contrary be given increased attention; intervening states should compare the cost of intervention to the cost of doing nothing (Crocker, 1996).

IX. PEACE SUPPORT OPERATIONS AS AN INTERVENTION TOOL

Data from the key respondents indicated that one key military tool that is manifest in conflict management in the Horn of Africa is the use of Peace Support Operations (PSOs) as an intervention tool. In the wake of the advent of viable regional integration schemes, it would be important to delve into the role of regionalized military diplomatic forays in instances where a country intervenes directly through regional and sub-regional

bodies such as the Inter-Governmental Authority on Development (IGAD), like was the case in Somalia.

Although the doctrines of sovereignty and non-intervention in the domestic affairs of states are fundamental principles of the international arena, intervention by states in foreign armed conflicts occurs frequently. Many foreign armed conflicts have prompted diplomatic, economic or military interventions by foreign powers.

Asked to mention types of conflicts that have attracted foreign military intervention, respondents mentioned two types. The first group includes neutral which are generally multilateral interventions and which are described as collective conflict resolution efforts organized by the international community to end the civil war and to bring peace and stability to the region. The overriding motive of neutral multilateral interventions under the auspices of the international community, such as the United Nations peacekeeping forces, is to restore peace in the target country. The second one is a unilateral intervention like the case of Kenya military intervention in Somalia citing self defence against threats to its territorial integrity and sovereignty. A key respondent interviewed in Nairobi on 18 November cited the Somalia conflict as a good example where military diplomacy and diplomatic tools have played a significant interface with the international community showing commitment, albeit, at different levels almost reluctantly because of the prevailing circumstances: A good example of the regionalized military diplomacy is the international response to the Somali civil war.

Marangio (2012) argues that international actions towards the Somali crisis have all tried to address four main issues bedeviling the failed state of Somalia, namely; internal conflict, piracy off the expansive Horn of Africa's coast, terrorism and Islamic fundamentalism, and, development. The author opines that efforts expended towards tackling these issues have varied over time in terms of actors and actions, and have privileged security conditions first and then addressed piracy and Islamic fundamentalism as they arose (Marangio, 2012).

However, Marangio (2012) doesn't delve into the non-humanitarian aspect of interventionism thus; the push for domestic politics, the quest for the consolidation and protection of foreign markets as well as the creation of new ones, quest for hegemonic powers among other ulterior motives masked under the guise of humanitarianism in a given neutral interventionist policy. This explains why one key respondent interviewed in Mogadishu on 15 December 2018 said:

...while there is a keen interest in fighting terrorism in the Horn of Africa, one wonders why the international community has remained reluctant in supporting Kenya's request of listing Al Shabaab as a terrorist group under United Nations Security Council - UNSCR 2026 like they did with the Taliban over the sale and use of opium.

From the foregoing, it is clear that terrorism if understood from the political economy of the concept has far reaching ramifications. The end state has a business and economic connotation of a political market place as well said by De Waal (2015) because even aid agencies believe listing Al Shabaab as such will deny them access to victims of Al Shabaab terrorism.

Other Tools other than Military

The study sought to know the programs used that are non-military in intrastate conflict management. The respondents listed; support to civic activities, intervention through parliament, diplomacy meetings, disarmament and amnesty, engaging opinion leaders and humanitarian Aid. Asked to mention other tools other than the military, respondents, name the following including; people to people and leader to leader's reconciliation, support and strengthening cultural exchanges, establishing an IGAD coordinating mechanism, tackling political economies of violence and war, addressing gender and age related issues, promoting good governance and addressing the problem and promoting religious cooperation.

1. Civil Military Cooperation

Militaries are trained to handle diverse goals, mixed practices and assorted actors in a Peace Support Operational environment like South Sudan, Darfur and Somalia. A deduction was made from the findings of the study that the military peace keeper is a soldier-relief worker, soldier media expert, soldier-doctor, and soldier-chaplain always necessitates a beginning point that is military in nature. This builds a strong nexus between military diplomacy and military intervention.

This collaborates one of the findings according to Ligawa (2018) that in organizational hybridity, civil-military cooperation enjoys the centre stage in military diplomacy. This study found out that this provides a cocktail of activities that links structures to actual performance. CIMIC activities are a military creation dominated by military considerations, mostly headed by military heads to achieve military objectives. CIMIC is a perfect link between military and civilians. A CIMIC officer who worked in South Sudan and Darfur was interviewed in Nairobi in January 2018 and said:

CIMIC activities are the gateway to local populations, NGOs or civilian officials through its activities you win the hearts and minds of the populations for conflict management to prevail... According to the informant, CIMIC officers are charged with various tasks including; Planning and Coordinating between elements of the Peace Support Operations, running joint Operations centered on human rights, political and civil affairs and joint assessment with partners. One important element of CIMIC activities is Quick Impact Projects (QIPs).

A Colonel charged with Quick Impact Projects (QIPs) in AMISOM interviewed in Mogadishu on 16 December 2018 cautioned on the effects of poor coordination of humanitarian operations geared towards conflict management saying: Uncoordinated humanitarian operations cause friction, impose extra demands on military resources and may affect the Peace Support plan of the mission.

Therefore a sound Civil Military Cooperation (CIMIC) plan and cordial peace support co-operation between military operations and the operations of UN agencies, Inter-Governmental Organizations (IGOs) and Non-Governmental Organizations (NGOs), are therefore vital to the success of multidisciplinary and multidimensional PSO. From documentary analysis, it is only through CIMIC activities that a cocktail of activities are achieved through a cocktail of structures. For example for medical campaigns to yield the desired results, local administration need to be reached. The military will provide medical experts and security while the international partners will provide financial and

material support. This interface between military and other tools requires clear coordination. The idea of coordination is clarified in the AMISOM Standard Operating Procedures (SOP) which clearly and strictly considers; transitional assistance, supervision, administration, protection, response, control and coordination.

a. Transitional Assistance

Transitional assistance refers to all forms of military assistance to a civil authority or community rendered as part of a wider diplomatic, humanitarian and economic strategy to support a return to peace and stability. The need for this assistance is predicated on the widespread destruction of conflicts on infrastructure and institutions. AMISOM has in its mandate a Transitional Assistance clause to help stabilize the institutions by providing a secure and enabling environment as it hand over security of the country to the Somali Security Forces.

The degree of destruction or disruption will dictate the scope of transitional assistance that could range from direct help to interim administrations, local authorities and civil communities to the complete establishment and running of the transitional government as in Cambodia, Kosovo and East Timor. In Somalia, successful elections in Federal Member States (FMSs) is critical for the central government elections under Federal Government of Somalia (FGS). Transitional Assistance is a post-conflict activity that could be enhanced if accompanied by parallel reconstruction and peace-building efforts. Military transitional assistance tasks could be categorized according to findings of this study as supervision, administration, protection, response, control and coordination. This is what this study proposes as the SAPRECOCO of transitional assistance towards conflict management. Similarly, the functions fits well in the functions provided under compensatory power that helps to win the hearts and minds of the population in order for conflict management to take pace.

b. Supervision

Military transitional assistance through supervision would include the transition of authority to the local administration, restructuring and retraining of security forces, which would include their recruitment and finally relocation and rehabilitation of refugees and Internally Displaced Persons (IDPs). In the transitional phase towards the recognition of South Sudan as an independent state a lot of supervisory military diplomacy was exercised to ensure secure environment in the region. This process of transitional assistance is still ongoing.

c. Administration

It was observed from key informants that in Somalia and Sudan, apart from the traditional military roles, the military during the transition period also engages in liaison and establishment of an interim government and help in the provision of Public services and utilities including water supply, wells and bore holes, electricity, transport, communications, health and hygiene. These functions are performed under the name of Civil Military Cooperation (CIMIC) and Quick Impact Projects (QIPs). With such economic and social services the military provides sound environment for the government to function.

d. Protection.

The military during the transition period is also expected to perform protection function. This includes Protection of human rights; thus women, children, elderly and protection of people with

disabilities. Similarly included in this function is Safeguarding of individuals, communities and installations. This is clearly embedded in the mandates of AMISOM and UNAMID. These are clear tenets of military diplomacy where condign power is less used in effecting this function.

e. Response

At all levels of the Peace Support Operations the force or mission commanders must maintain reserves and contingencies to be able to respond to and influence fresh situation. Some of these situations are known with clear information sharing, which is made possible from good relations with the local community through constant interaction, which is a function of Military Diplomacy.

f. Control

To maintain the co-operation and consent of the local authority and community, commanders apply prohibitions and restrictions fairly and proportionately when enforcing collective control measures. Control and dominance of areas is not only achieved through application of condign power but also utilization of military diplomacy as a function that endears the military to the populations by winning hearts and mind and trust of the communities they intend to liberate.

g. Co-ordination

All major activities must be coordinated with other co-operating organizations and agencies. This coordination brings on board various aspects through what scholars like Swistek (2012) refers to as Comprehensive Approach to Security (CAS).

2. Complementarity of the Soldier Military Diplomat

The complementarity of the military in conflict management in the Horn of Africa is clearly exhibited in the role that this study as classified as the Soldier Relief Worker, Soldier Engineer, Soldier Doctor, Soldier Media Expert contributes to conflict management in the Horn of Africa. These roles clearly demonstrate the significant interface between military diplomacy tools and military intervention in intrastate conflict management.

The Soldier-Relief worker

The work of a soldier is also explicit in humanitarian intervention through relief work. Humanitarian intervention in a foreign conflict may take two shapes; non-militarized humanitarian intervention and militarized humanitarian intervention. Even though the modern international system is founded on the premise that sovereign states have a right to nonintervention as well as to be free from unwanted external involvement in their internal affairs, controversy has emerged on the extent to which the world can watch as atrocities are visited upon a people inside a sovereign state. A key respondent interviewed in Mogadishu on 15 December 2018 said:

We entered Somalia under the banner of Pan Africanism...you cannot sit back as your neighbour's house is burning... Somalia was burning and the effect was great on the entire region...

From the findings Somalia had reached a humanitarian crisis and needed something to be done. The situation in Somalia is collaborated by Seybolt that proponents of humanitarian interventionism mainly decry the loss of human life (Seybolt, 2008).

In practice, according to AMISOM SOP (2007), the scale of humanitarian problems and the demands for security and protection of humanitarian resources will always elicit a lot of military diplomacy. Military relief operations, where the capacity exists and is mandated, should provide according to a CIMIC Officer interviewed in Juba on 16 October 2018:

Emergency relief for the sustainment and protection of the means to safeguard life, delivery of aid/relief supplies, prevention of human rights violations, quick-impact reconstruction assistance, long-term reconstruction assistance and assistance to local authorities.

All these require serious diplomatic engagement with the belligerents. To get the projects initiated and done requires a lot of coordination and engagement with donors yet the activities are key to help win hearts and minds and trust of the population for conflict management to take place. Engagement of the military in such is what this study likened to the Soldier - Relief worker.

The Soldier-Law Enforcer

Normally, law enforcement will be the responsibility of the Military Police, local and the civil authorities. However, military operations contribute to the overall level and quality of law and order. When this deteriorates, military enforcement action and support to the police may be necessary to restore and maintain the peace.

Besides all legal matters are handled by a Legal officer who also deals with government agencies on legal matters pertaining customs, insurance, claims, jurisdictional problems. S/he assists the Chief Administrative officer on the legal aspects of commercial dealings and advises the Provost Marshal in any peace support operations environment on legal matters. Asked the balance between law and military undertakings, a legal officer who worked with IGAD and interviewed in Juba said:

I work in a multiagency setup where national interests and institutional biases have a big influence on relations but being a lawyer in uniform has helped me to be diplomatic in dealing with people...so we get along well.

The above finding indicates the significant role a legal expert plays as s/he puts on two hats; one as a legal person and the other as a military person who has national interests to pursue yet s/he has to balance with those of the other multiagency teams s/he represents in a peace support environment. This is a delicate balance that requires military diplomacy.

The Soldier Media Expert

The role of the media in providing timely information in the theatre of war plays a crucial role in intra state conflict management because most of the issues in warfare are brought to the fore by media. To do their jobs, journalists employ both the camera and the computer, and, with the help of portable satellite dishes and video phones, stream or broadcast their reports from hotel roofs and hilltops, as they cover the movement of troops and the rocketing of villages often, (unintentionally, one assumes) revealing sensitive information to the enemy.

Once upon a time, such information was the stuff of military intelligence acquired with considerable effort and risk; now it has become the stuff of everyday journalism. A media officer who served in AMISOM as a spokesperson said:

The camera and the computer have become weapons of war. For any journalist in uniform worth his or her salt, this should spark a respectful moment of reflection.

In the Horn of Africa media timely reporting enabled military media experts to bring the ugly reality of conflict to both belligerents (and others around the world), serving as a powerful influence on public opinion and governmental attitudes and actions. This study collects one media expert analysis provided on the analysis of media trends of reporting by AMISOM accessed in Mogadishu; Asked what they do with the very elaborate analysis, a respondent interviewed in Mogadishu on 14 July 2019 said:

We use what we have analyzed to understand the patterns and perceptions of the population on activities of the mission...you know media has a big influence on people...

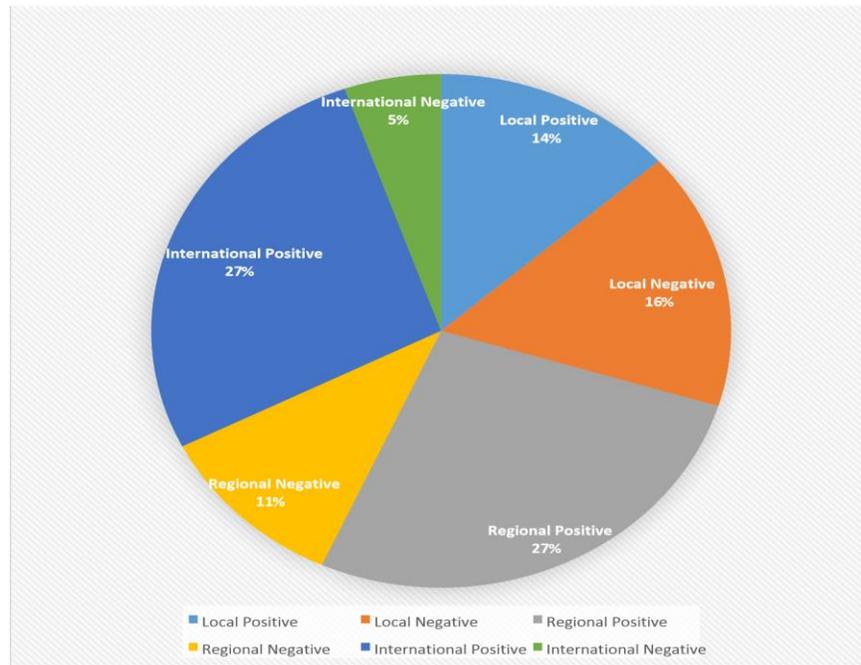


Figure 5: Analysis of Media in News in November 2018
 Source: AMISOM Archives, 2019

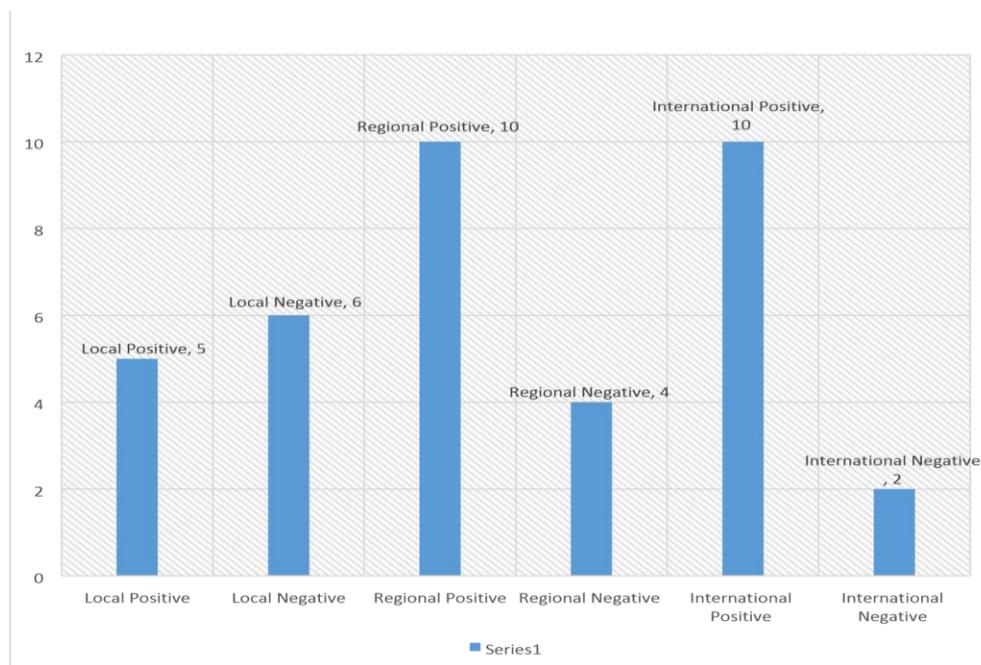


Figure 6: AMISOM in the News November 2018
 Source: AMISOM Archives, 2019

Due to the academic interest of what is happening in Somalia, opinion pieces tend to cover the slow process of building the capacity of Somali security agencies. In an interview with the Military Spokesperson conducted in Mogadishu on 16 December 2018, it was interesting to note that his function requires a lot of diplomacy:

The office of Force Spokesperson will always work in close consultation with the Mission Headquarters (MHQ) Public

Information Unit (PIU)...and this extended to the local Somali media houses.

The informant explained that his office is designed to provide information through all mass communication means to AMISOM audiences by responding to media inquiries, issue statements, conduct briefings and interviews, arrange for access to operational units and distribute information including imagery all

as a means to develop relations with the purveyors and the consumer of news. This is done through outreach programmes: ...these are activities aimed at fostering strategic relations with the key external stakeholders, who have an interest in AMISOM military issues and activities, such as think-tanks, academia, military related associations, and other non-news media entities. The issue of military diplomacy expositied in public diplomacy is one of the areas in intrastate conflict management that seeks the attention and also the various states and agencies engaged in conflict management in the Horn of Africa. Activities in the theatre are carefully tailored to meet the demands of the conflict zone without compromising the operations. For example an attack on peacekeepers is reported with a lot of caution not to destabilize the victims' families. The media office therefore plays a critical role to shape public opinion and help win hearts and minds for conflict management to take shape.

The Soldier-Doctor

The role of the medical practitioners in a conflict zone goes beyond just the conventional treatment of patients from conventional diseases like malaria, Typhoid and injuries but also manage conflict related ailments and even those caused by gunshots. While doing this, it is not restricted to avoid perpetrators of conflicts but would serve as a very important asset to the conflict if they were handled diplomatically. A doctor who served in both AMISOM and UNMIS, interviewed in Kismayo on 13 October 2018 said:

As AMISOM medical team we engage in various activities that just go beyond treatment but assist the mission to win hearts and minds of the locals in order to pacify them. This enables the process of peace building to take place...I call it the power of the syringe...

The Soldier-Chaplain

The military are usually associated with the 3Ws, thus War, Women and Wine. This is a perception that is carried along in the conflict zones. Similarly parties to the conflict are equally associated with lots of vices including rape, killing and extortion. This study however found out that instead of religion being used for spiritual nourishment during peacetime it is sine-qua-non weapon of conflict management used by the military in the Horn of Africa, as one Commanding Officer interviewed in Kismayu on 14 October 2018 would say:

In my battalion, I have a full complement of the chaplaincy in uniform; I have a priest with his catechists, I have an Imaam and a protestant Pastor. All these underwent military training. They have two weapons; the Bible/Quran and the gun/rifle.

The role of the chaplaincy is to spiritually nourish the soldiers as they partake the role of conflict management. They also pacify the locals by not only preaching to them but also assist by construction of mosques and churches:

The church we attend here was constructed through our voluntary contributions. Each soldier volunteered five hundred Kenya shillings every month. We have also supported the construction of a primary school.

This activities by the chaplaincy are used to pacify the communities in order for the peace building process to take place. Interestingly, while this tenet of military diplomacy was prevalent

among the BDNF and KDF troops, it was noted that this is not a norm among the Uganda Peoples Defense Forces who do not value religion within the military cycles. One respondent interviewed in Mogadishu confirmed:

Since 1986, we do not encourage religion in the military barracks because religion is used to divide soldiers along religious lines like ethnicity does...

The above sentiments agree with Elsenhans (1996) views that while politics is the ultimate cause, ethnicity and religion are factors of mass mobilization that are given prominence by the disgruntled political elites fighting against what the author calls state classes. This study therefore depicts religion as a tool which some militaries in the study area like Burundi National Defence Forces and Kenya Defence Forces have appropriately used to galvanize hearts and minds for conflict management processes to be initiated.

Soldier-Engineer

Asked to explain the role of an engineer officer in the operation, a Kenya Engineer Officer who had served in both Somalia and south Sudan said the mission of engineers is to provide mobility, survivability and general engineering support to PSO missions. Engineers undertake defensive and survival works within the Areas of Responsibility. Engineer staff will identify utility repair requirements and priorities, in conjunction with local authorities, with whom they will also negotiate, and organize military support for the repair missions, as well as advise, assist and support units with regard to utility repair matters with their AORs. All items, including sub-munitions, mines, bombs, booby traps, suspect items and abandoned attractive equipment, are assumed to be a hazard to the smooth operations of the mission.

X. CONCLUSION AND RECOMMENDATIONS

Based on the findings, there is a lot of interface between diplomatic tools and military intervention in the Horn of Africa. The study found out that arms transfer was the most common diplomatic program used by the military, in contrast weapons shipments increase the duration and hostility levels and make the termination of civil conflicts less likely. These efforts are complemented by compensatory interventions including peacekeeping military, humanitarian agencies and NGOs functions which provide the necessary assistance, not only towards the DDR programme, but also enhancing local and national capacities through active engagement, consultation and participation in the planning and implementation of the programme.

It is recommended that the 'carpenter's tool box' model be adopted in which every item in the tool box has a specific role to play in conflict management and, therefore, it is the complementarity of the efforts between the military, police, civilian components and entirety of society that will lead to conflict management in the Horn of Africa. It is apparent from the foregoing, therefore, that through military diplomacy one may be able to discern a country's national security interests and threats vis-a-vis its relations with other countries. One is also able to identify a military's organizational ethos, philosophies, culture, strengths and weaknesses for the sake of conflict management in the Horn of Africa. Military diplomacy will remain important in framing and enabling the evolution of the world, but unless

practitioners get better at the civilian side of things it is difficult to understand how the security challenges in the Horn of Africa can be effectively managed.

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A Review of Industrial Air Conditioning Related Diseases and their Effects on Production (A case Study of Legionnaire Disease in the Textile Industry)

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Abstract: An air conditioner has enormous effects on its users through its air-conditioning processes for many years. Hence, this research is focused on the various air conditioning related diseases, especially the Legionnaire diseases and their effects on production in the textile industry. The study displays the negative effects of the Legionnaire diseases on production as well as highlighting its causes, signs and symptoms, diagnosis and the recommended associated treatments. The study ends up educating all refrigeration technicians, mechanics, engineers and students on this disease and its effects on their various domains of operation. The research used both primary and secondary data. Primary data was collected using questionnaires. Secondary data were mainly gathered from related articles, journals from the internet, published and unpublished books and other sources on the area of study. The data gathered were analyzed using simple statistics such as percentages and figures.

Keywords: Air condition, Building syndrome, Disease and Textile, Legionnaire.

1. Introduction

One area of great concern related to air conditioning but not strictly to cooling is building related diseases. Work in the textile industry has been associated with many symptoms involving the respiratory tract. Also, ambient conditions influence open-end spinning and performance of yarn in weaving and legionnaire disease problems on operating personnel. Legionnaires' disease has a false but enduring status as an exotic plague. In reality, this disease is a common form of severe pneumonia, but its infections are infrequently diagnosed. Failure to diagnose Legionnaires' disease is largely due to a lack of clinical awareness. In addition, legionellae, the bacteria that cause this disease, are fastidious and not easily detected (Fields, Benson, & Besser, 2002). Legionnaires' disease, also known as legionellosis is a form of a typical pneumonia caused by any type of Legionella bacteria. Signs and symptoms include cough, shortness of breath, high fever, muscle pains, and headaches. Nausea, vomiting, and diarrhea may also occur. This often begins 2–10 days after exposure (Fields, 2002).

There are several generally recognized areas of concern with respect to Indoor Air Quality (IAQ), materials which emit pollutants' primary emitters and secondary sources/sink re-emitters, indoor combustion, outdoor sources, biological sources and occupant activities. These sources are generally grouped into three broad classes: construction materials, interior fixtures and furnishings, and consumer products (Brent, 1994).

Cunha, Burillo, & Bouza (2016) made a study stating the history behind this disease. Bacteria of the genus Legionella were discovered during the investigation of a major pneumonia outbreak in members of the American Legion attending their annual meeting in 1976 in Philadelphia. The causative microorganism was an unknown bacterium and was designated Legionella pneumophila. The term given to the infection was Legionnaires' disease, which refers to the pneumonic form of legionellosis. About 29 (16%) of 182 patients died, since this new type of pneumonia did not respond to β -lactam antibiotics. Legionnaires' disease is usually spread by the breathing in of aerosolized water or soil contaminated with the Legionella bacteria. Experts have stated that Legionnaires' disease is not transmitted from person to person. Fig 1 presents the effects of the disease on the human anatomy, especially on the lungs of the patient.

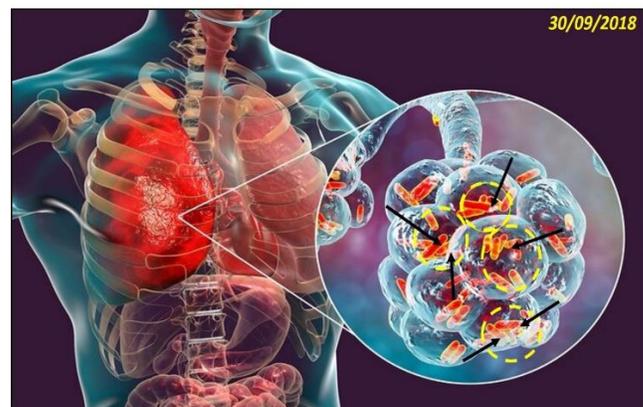


Fig 1. Legionella bacteria (Jennifer, 2019)

In 2014, one case of possible spread from someone sick to the caregiver occurred. Rarely, it has been transmitted by direct contact between contaminated water and surgical wounds. The bacteria grow best at warm temperatures and thrive at water temperatures between 25°C and 45°C (77°F and 113°F), with an optimum temperature of 35°C (95°F). Temperatures above 60°C (140°F) can therefore kill the bacteria. Sources where temperatures allow the bacteria to thrive include hot water tanks, cooling towers, and evaporative condensers of large air conditioning systems, such as those commonly found in hotels and large office buildings. Though the first known outbreak was in Philadelphia, cases of legionellosis have occurred throughout the world (Fields, 2002).

2. Brief review

Fatigue and illness: Harmattan day is best countered by sitting in an over-conditioned environment. But, that will most likely cause you to have constant headaches and to feel fatigued even when you just had breakfast, or woke up. Fatigue and headaches usually become chronic for those who chose to sit under the air conditioner for a long time. Also, working or living in a constantly cooled-off room will make you experience constant mucous membrane irritation, along with breathing difficulties. This can be deadly for those with lung problems, but it also affects those who are perfectly healthy by making them more vulnerable to flues, contracting colds and other diseases (Lawson, 2015).

Problems with breathing: As stated by Lawson (2015), germs and many other micro-organisms that cause breathing problems use the air to travel. Air conditioner is making their journey easier, and is helping them spread out. Also, having the windows shut and the air conditioner on causes these disease-carriers to circulate around you all the time and traps them. The worst disease that is air-borne is Legionnaire's Disease, known to be fatal by causing pneumonia and fever. The only solution to this problem is to create a constant flow of fresh air and to refresh your air conditioned environment every 15 to 20 minutes.

2.1 Causes and Transmission (Study on Scene)

After the outbreak of the disease, many surveys were taken to examine its causes. Glick et al., (1978) stated in their research, the probable relationship of illness to exposure in the health department building became apparent early in the epidemic. Initially, only employees who had been in the building on Monday, July 1, became ill. Exposure prior to Monday, July 1, did not produce illness, with the possible exception of one employee who was present in the building early June 29 as well as on July 1, and became ill during the evening of July 1. Many visitors and one employee who had not been in the building at all in the latter part of June, and some of them never before, developed illness after exposure on July 1. There were no common exposures outside the building.

A survey in adjacent buildings of the county service complex and in the community detected no unusual incidence of illness. There was no common exposure to foods in the employee group, nor had all affected persons used water from the building for drinking or washing. Moreover, numerous visitors became ill without prior consumption of any food or water from the building. In addition, illness in six investigators who had minimal community contact provided strong evidence for localization of exposure in the health department building. Thus, simply being in the health department building appeared to constitute exposure, since no specific activity appeared to entail exclusive or increased risk. Particular areas in the building did not appear to be associated with higher risk, nor did any section of the building clearly confer protection. The explosive onset of the epidemic, as well as lack of evidence supporting other modes of exposure, suggested airborne spread of disease and drew attention to the air-conditioning system. Certain days were associated with higher risk than others.

The air-conditioning system was turned off on Saturday, July 6, and persons newly exposed that day did not become ill within the range of expected incubation periods, but did become ill approximately 40 hours following exposure to the building, after the system was restarted on Monday, July 8. Moreover, attack rates were higher in persons exposed during that morning than in those first exposed in the afternoon or evening, suggesting increased risk after restarting the air-conditioning system. Again, late Thursday morning, July 11, the entire air conditioning system was turned off for approximately one-half hour and then restarted. Five persons present in both the morning and the afternoon became ill; two persons present only in the morning did not become ill, while five persons present only in the afternoon became ill. Investigation of the air-conditioning system.

By July 25, extensive laboratory and environmental investigation had not yet uncovered an etiologic agent. Since all epidemiologic evidence pointed to the air conditioning system, a detailed examination of the structure and function of the system was undertaken. The air-conditioning system consisted of two air circulation systems that were separate but had ducts next to each other. The first system cooled refrigerant gas for the second system, which cooled air for the entire building.

The first system circulated air from the basement through an evaporative condenser to the outside via a metal duct and discharge vent on the roof at a point less than 2 meters from the outside air intake of the second system. The air of the first system flowed through water sprayed within the evaporative condenser from a reservoir at the base of the unit to which algaecide was periodically added. This air was supersaturated with water from the sprays as it moved up the metal duct. The second air circulation system used fresh air from outside, as well as a percentage of recirculated air from the building, to cool the building. Outside air was passed through a low efficiency filter,

cooled, and dehumidified in the air-conditioning unit proper, and distributed throughout the building by a system of supply-air ducts.

On July 29, several openings were made in one of the six main supply-air ducts of the air-conditioning system. Looking through these holes revealed that condensate from the water aerosol in the evaporative condenser discharge duct could, and in fact did, at times drain directly into an adjacent supply-air duct through cracks in both duct systems. Furthermore, by means of smoke artificially generated and a non-toxic tracer gas dispersed in the discharge duct of the evaporative condenser, it was readily established that exhaust air from the evaporative denser could contaminate the independent circulation of conditioned air in ducts supplying the building. This occurred both by simple leakage from duct to adjacent duct and by airflow between closely spaced exhaust and intake vents on the roof.

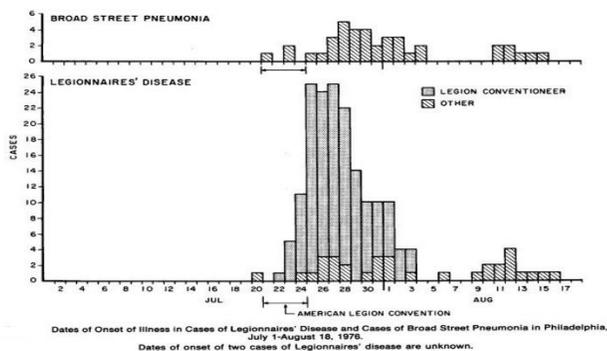


Fig 2: Legionnaires' disease out breaks (SITRA, 2008)

Table 1. Legionnaires' disease outbreak

Suspected Source	Cases	Deaths	Date	Location
Cooling tower	7	0	31 st Dec 2006 – 1 st Jan 2007	Australia, Sydney
Unknown source	4	0	Nov 2006 – Jan 2007	Phuket, Thailand
Cooling tower	26	2	July – Sept 2006	Paris, France
Cooling tower	30	2	July 2006	Amsterdam, Netherlands
Cooling tower	149	0	June 2006	Pamplona, Spain
Cooling tower	10	1	Feb 2006	Sydney, Australia
Cooling tower	20	0	Dec 2005	Torrevieja, Spain

Cooling tower	127	21	Oct 2005	Toronto, Canada
Cooling tower	21	0	June 2005	New Rochelle, NY, USA
Indoor ornament fountain	17	1	Summer 2005	Rapid City, SD, USA
Air scrubber	52	10	May 2005	Fredrikstad, Norway
Cooling tower	86	21	2004	Pas-de-Celais, France
Cooling tower	172	7	2002	Barrow, UK
Cooling tower	28	7	2001	Stavanger, Norway
Cooling tower	449	6	July 2001	Murcia, Spain
Whirlpool and humidifier	200	32	1999	Bovenkarspel, Netherlands
Cooling tower (widely accepted)	221	34	1976	Phildepia, PA, USA

Source: SITRA, 2008

As compared to our modern textile factories, air conditioning has been the main source of circulating the Legionnaire disease. Hence, posing a great threat to the production industry.

2.2 Signs and Symptoms

The symptoms of Legionnaires' disease generally develop between two and 10 days after exposure to Legionella bacteria. The earliest symptoms include chills, headache, body weakness, fatigue, and a fever of 103 degrees or higher, and can get progressively worse over the first few days. As the condition progresses, other signs and symptoms include: a severe cough that may produce mucus or blood which is usually the first sign of a lung infection; shortness of breath and chest pain; and gastrointestinal issues, like vomiting, diarrhea, or nausea. It is worth noting that Legionnaires' disease can share symptoms with many other conditions—like the common cold or the flu, or a related condition called Pontiac Fever (Prevention, 2016).

3. Humidifier Fever

Humidifier, fever is not an infection but an allergic reaction to certain micro-organism, which can grow in the stagnant water of the humidifier's reservoir, when the unit is not in use on weekends. The concentration of micro-organisms is sprayed into the space causing a reaction of headaches and flu-like symptoms. As the concentration is diluted by replacement water, the reaction diminishes until is hardly apparent by the end of the working

week. Unlike the legionnaire disease, if the affected one moved out of the contaminated space, the reaction stops.

Sick building syndrome is the most difficult to understand as there seems to be no one causes that can be identified as the main reason for its incidence. Insufficient ventilation, poor air quality, inadequate maintenance and lack of individual control have all been related to central plant in large building. Parts of the problem could be caused by people expecting air conditioning to provide the ideal environment for them and when it does not, dissatisfaction occurs. The syndrome does not seem to happen in the smaller installations.

Yarns are frequently conditioned so that they will not snarl, untwist or kink when used for further processing. Such conditioning tends to bring all the yarn to standard moisture regain so that uniform properties are obtained which facilitate slashing and other processes. Three systems are often used to accelerate this process. The first of these systems involves spraying the yarn with fine mist of water containing a small proportion of wetting agent. In the second system yarns are conditioned by exposing them to an atmosphere kept at 90 RH and 120 for an hour. The air is normally circulated and automatically controlled to the desired conditions.

Maintenance of optimum atmosphere conditions is important in weaving. Although the strength and elongation of cotton yarns increase with increasing humidity maximum efficiency is not obtained from loom operatives at very high humidity. Moreover, the strength and elasticity of starch films begin to decrease when humidity exceeds 80% -85% the net result is therefore detrimental for weaving. A fast moving warp will require more humidity since the yarns are not exposed to conditioning for a long period as with slower weaving wraps. Relative humidity in the range of 75% to 85% are generally recommended for cotton weaving. While cotton increases in strength as its moisture content increases, just the reverse is true for rayon. Therefore weave-room humidity from 65-72 RH at 78% are recommended.

Comprehensive studies conducted by SITRA (2008). The importance of ambient atmospheric conditions in the processing and testing of textiles is well known. Some of the most important physical properties of textile fibres are closely related to their behavior in various atmospheric conditions. Changes in temperature and relative humidity of the atmosphere result in change in weight of the textile material as well as its strength and breaking elongation. Control of atmospheric conditions in a textile mill also ensures reasonable comfort for the operators and prevent deterioration of operative efficiency. From a technological point of view also, ambient atmospheric conditions play an important part. Practically all textile fibres shows increased pliability and greater immunity to static electricity where increase in moisture may be deposited on the fibres and they become sticky during processing. Thus there is an optimum level of temperature and relative humidity at which chances of adhesion between fibres are minimized.

A considerable amount of heat is liberated in the spinning and weaving departments from the processing machines themselves. A little heat is added by the people working and also there by the electric lights provided. A substantial amount of heat also comes in particularly during the dry season, through the roof, walls and windows. Had there been no requirement of ambient relative humidity, the heat load could have been disposed of merely by good ventilation. Air conditioning system is therefore required to maintain relative humidity within close limits if there are no requirements of ambient by good ventilation. The system generally used is textile mills with the evaporated cooling type and forced air circulation.

Air-conditioning plants used in textile mills consist of a circulating fan, an air washer or humidifier, which is meant to saturate the air, and ducts which circulate the air to different parts of the conditioned space. As the air is saturated with moisture adiabatically, its dry bulb temperature goes down to its wet bulb temperature. By circulating this cool air in the conditioned space, the heat load is taken care of and simultaneously a reasonably comfortable temperature is maintained in the department. Relative humidity is adjusted by varying the quantity of moisturized air in the loom shed. Water atomizing nozzles are also provided in the conditioned space in order to boost the relative humidity in the department to a sufficiently high level. In the plant the departmental air is to be re-circulated through the air washer in order to conserve heat during rainy season. In more sophisticated plants, the recirculation is achieved by means of forced exhaust system. The exhaust fan draws air from the department through an underground duct and through air filters and pushes it back to the air washer or to the outside atmosphere. Again, in still more sophisticated air circulating plants, a refrigeration system is also provided. It makes the working more possible to provide very comfortable conditions while maintaining relative humidity at the stipulated levels, even when the outside atmospheric conditions are adverse. Air-conditioning plants for textile mills may be divided into where high relative humidity levels are to be maintained as in the loom-shed, the common practice is to provide supplementary humidification. The main plant is designed to maintain relative humidity to about 60% to 65% and the supplementary humidification system is provided to raise the relative humidity to the required level of around 80%. It is, however, possible to achieve an ambient relative humidity of 80% without supplementary humidification. Such a system where supplementary humidification is eliminated is called all-air system (Fig.3).

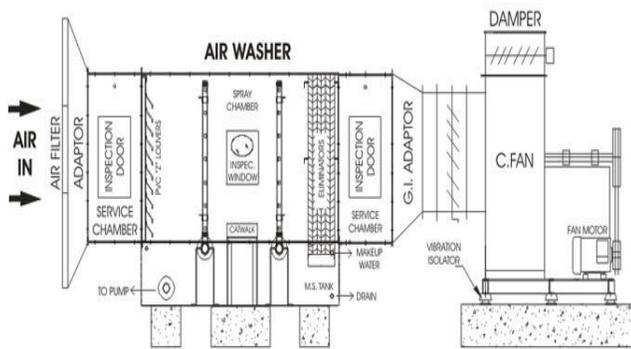


Fig 3. Air washer sections (Dvna, 2013)

The one with supplementary humidification is called the split system, because the task of raising the humidity is split between the main plant and the supplementary humidification plant. Air circulation capacity of the main plant in the case of all-air system should be quite high, about three times, as compared to the split system. This would result in high capital cost and high operational cost.

With supplementary humidification, it is found that the relative humidity is not as uniform as desired. Due to water being sprayed in the conditioned space, liquid particles of water can reach right up to the looms before they evaporate completely. When the water evaporates, its dissolved solids are liberated in the form of the powder. This powder is abrasive and corrosive and has an adverse effect on the weaving process as well as the machinery. It has been found that a loom-shed with all-air system gives better production efficiency than one with supplementary humidification. Experience of mills is that the benefits from the all-air system are large enough to compensate for its capital running cost.

Without supplementary humidification, one has to depend on the main plant only for raising the relative humidity. So it is obvious that the relative humidity of the saturated air from the main plants should be higher than that to be maintained in the conditioned space. For example, if one wants to maintain 80% relative humidity in the loom-shed, the relative humidity of the air from the air washer should be more than 80%. Normally, with the well designed and well maintained air washer, it should be possible to achieve 95% relative humidity after the air washer. But operational studies by SITRA (2008) indicate that the relative humidity of air coming from the air washer is 80% or lower in many cases. With the split system, this does not create a serious problem as the relative humidity is made up by the supplementary humidification to the required level.

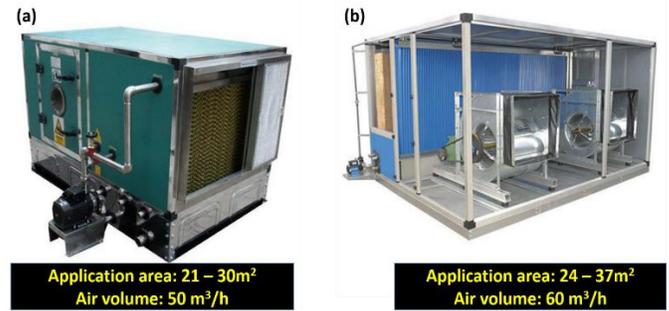


Fig 4: Air washer unit. Source (Indiamart, 2013)

With the all-air system, if the air washer efficiency is not up to the mark supplementary humidification is not available to come to aid. This is an important factor in considering the all-air system for a loom-shed.

If the all-air system is to be chosen, one should be very careful about the capacity and design of the plant. Maintenance of the plant is critical and all the support it needs by way of men, material, and supervision should be provided ungrudging and promptly. If these are not likely to be forthcoming, it is better to continue with the conventional split system of air-conditioning in the loom-shed. The disadvantages of the all-air systems are; [i] high capital cost, [ii] high operating cost, and [iii] the necessity for very good maintenance. But it is better because of, [a] uniform conditions in the loom-shed and therefore improved loom-shed performance, [b] less corrosion, and [c] better comfort. Firstly, because of much higher rate of air circulation, there is greater air movement leading to improved comfort. The more important reason to improve comfort is that the dry bulb temperature in the room is lower in the case of the all-air system than that in the split system for the same level of relative humidity (Manohar, 2005).

4. Equipment Design and Construction

The design and construction of equipment is a challenging subject, dealing with a purposeful activity directed towards the fulfilment of human needs. This requires consideration information such as feasibility of certain systems within the limiting factors namely; physical reliability economic worthiness and financial feasibility (Manohar, 2004). Chilled water unit equipment is pre-engineered and built on a production line where the manufacturer has designed the unit to work within pre-selected conditions, using standard components which includes a preset refrigeration circuit to achieve those conditions.

In reference to the research and design work at hand, the researcher is of the view that, the implementation of this project would modify a portion of the old plant. In the chilled water system there are separate units. The main plant, consisting of fan, air washer and other accessories are located in a plant room which is outside the conditioned space. Only the distribution system is in the conditioned space. The distribution duct is connected with the plant but is not integrated to it as one unit.

The air circulation fan is of the axial flow type. They are the most suitable for high discharge against low pressure head; when the pressure head is large, multi-stage axial flow fans are used. Their efficiencies are generally higher than that of the centrifugal fans. So whenever energy saving is an important factor, they are preferred (Manohar, 2004).

4.1 The Existing Plant before Modification

The existing plant before modification is an air washer system. This system employs the use of the chilled water is sprayed directly. The chilled water is sprayed over an arrangement called the air washer, which is situated in a spray chamber. The cold temperature air is then extracted from the chilled water and then blown into the conditioned room for cooling. This arrangement would have been proper had it not been the legionnaire's disease which is related to water sprays. When within a particular temperature range becomes contaminated with the micro-organism called legionella pneumophila.

The organism occurs naturally and is not harmful under normal circumstances. It needs to multiply in contaminated water to cause the problem. At temperature below 20C it will hardly multiply, and above 60C it dies, therefore the ideal water temperature for operation should be around 40C.

The problem mentioned therefore, necessitate the replacement of the air washer with an air-handler which will eliminate the chilled water coming in direct contact with the cold temperature air being lowered into the space.

4.2 Modification

With modification the chilled water passes through tinned tubes arrangement. With the water passing through the tubes possibility of contamination does not exist, therefore the problem of the legionella and it's completely eliminated. With the air handler replacing the air washer the air-circulation duct can now be positioned at distance closer to the unit than it is with the air washer.

The air-circulated duct can now takes over from there and distribute the air throughout the conditioned space by means of diffusers. The duct is connected to the air conditioning plant by means of a duct system called the static region system. Air from the conditioned space is returned to the air handler through holes to an underground return air ducts, through filters and fans. There are several return air griller in the floor to ensure that the air is evenly exhausted as possible from the conditioned space.

4.3 Problems after Modification

Problems likely to be encountered after modifications are the ability to maintain the relative humidity levels in the conditioned space to the levels that they were before the modifications.

With the air washer system, the relative humidity of the air coming from the washer is likely to be about 80-85% therefore by the time it gets into conditioned space it is around 60-65% which is the set conditions for the mill. With the replacement of the relative humidity is likely to come down to 70-75% from the handler. Therefore, by the time the air reaches the floor of the spinning hall it would be around 50-55%, which is outside the humidity ratio range of the mill.

Direct atomization by centrifugal humidifiers is one of the means of raising humidity but it carries with it the disadvantage of throwing directly lots of water particles over a small area resulting in high humidity and corrosion of machine parts. The other is pneumatic atomizer which is better in many respects namely, good atomization, better distribution of humidity and less corrosion.

Compared with centrifugal humidifies they have other maintenance problems such as large number of mounted overhead, long pipes, compressor etc. This makes the system also expensive to install and operate. Another option left is to make use of the ambient relative humidity. With a humidistat installed in the conditioned space, the level of the relative humidity in the room can be checked and if it falls outside the predetermined levels the humidistat will then activate the louvre blades of the hall to open admitting into the hall fresh air with higher relative humidity to augment the indoor air. Such a system of supplementary humidification is called all-air system. Reductions in room cooling load, due to variation in the weather or by presence of additional heat gains from occupants or electrical equipment, are met by changing the supply-air quantity with terminal variable air volume controller until the room air temperature is stabilized. The minimum quantity of supply air permitted corresponds to at least the fresh air need of the occupants, thus the turn down may be from 10% to around 20%.

The conditioned supple air enters the hall through ceiling liner diffusers. The plenum acts as a header box to distribute the air uniformly through the spinning hall, several branch offs form distributed evenly. A throttling valve between the plenum (main duct) and the branches ensure there is control of the airflow rate.

Varying the supply flow has a strong influence upon the distribution of air into the room and the movement of air within it. The supply air is diffused into the room along the length of the main duct, which runs through the center of the hall, and also branch off at equal distance at both sizes, through supply air diffuses. Thirteen, four-way distributors will be installed in the branches to distribute air to the space. Each branch will distribute 430L/S of air into the rooms.

5. Methodology

This section discusses the methods and techniques employed by the researcher to obtain data for the study. It consists of methods of the population and sample size, sampling technique, data collection instruments, field experiences and methods of data analysis. Earlier on in the research proposal it was indicated that major part of the study will be carried on Juapong Textiles Factory and its surrounding areas. This project is dealing with Textile factories that already have an existing Air Supply System but since the project was to redesign the plant so that it can be a model for further improvement in the textile production using air conditioning, the researcher has tasked himself to redesign the duct system and possibly improve on the existing one to ensure increased production.

The single-duct variable air volume system is the type that I have adopted for use in this project, because it's the most suitable system employed for single-volume room such as sport hall, theatres, factories, etc. This is preferred due to their economy and controllability when applied to the air conditioning of the spinning hall. It is a cooling system with the air handling unit providing the lowest air temperature required. According to the values obtained from the load estimated for this project the volume flow rate for supply is 13.06m/s.

The supply duct system distributes air to the terminal units, register, or diffuses into the air conditioned space. Starting at the fan outlet, the duct can be fastened to the blower or blower housing directly or have a vibration eliminator between the blower and the ductwork. The duct system must be designed to allow air moving towards the conditioned space to move as freely as possible. Ducts are used to convey air [supply] return and re-circulated in an air conditioning space. In designing a conditioning duct system several factors must be considered such as the following;

- a) Space availability
- b) Noise level
- c) Duct heat gain [or losses]
- d) Duct leakages
- e) Balances
- f) Fire and smoke control
- g) Initial investment
- h) System operating cost

Ducts are usually rectangular, square or round. Round ducts are more energy efficient as they offer less resistance to air flow. Round ducts involve the use of less material to fabricate though square and rectangular ducts conform better to building construction and they fit into walls and ceilings better than round ducts. To space in building the tried today is to use smaller duct sizes which operate with about twice the normal air velocity. This requires the use of more powerful fans, which result in high running cost. In addition, high air velocity creates more noise. But this application is an industrial process noise is not major concern therefore that is the type that will be used in the design. A good duct design into use as large duct size is possible and less air pressure to give low velocity less power and lower noise.

There are three methods employed in duct sizing. These are Equal pressure drop, Velocity reduction and Static regain methods. Of these three is the equal pressure drop referred to as equal friction method, which is the most used method, especially for sizing low velocity system.

5.1 Design procedures

- i. Study the building plan and arrange the supply [diffusers] and return air outlets to provide proper air distribution within each space. The type and number of diffusers requires for each space will be decided by the room dimension and the throw, spread and drop characteristic of the diffuser.
- ii. Sketch the duct system, connecting the supply and return intake with the central station apparatus. Care must be taken to avoid running duct into building obstruction and equipment.
- iii. On the sketch, label the duct section fittings, etc. for easy identification. Indicate the air volumes back to the unit to get the total air volume require of fan.

5.2 Load Estimation

- i. The load affecting air temperature is from the sun transmission through the building structure and internal sources, such as equipment, lighting and people, whereas the load affecting humidity is mainly from ventilation, air and people. The size of the plant, distribution and terminal devices together control the complete system depends on this analysis.
- ii. Estimating a load that is too small will lead to dissatisfaction by the occupants, whereas overestimating will lead to high capital cost, rapid cycling and therefore inefficient plant operation, and unnecessary maximum demands for power.

Table 2: Data from the field

Source of Heat Load	Description	Quantity	Cooling Load Factor	Cooling Load Sensible	Cooling Load Latent
External Walls	North East Wall	175.68m ²	48w/m ²	8432.64w	
External Walls	South Wall	225.92m ²	80w/m ²	18073.64w	

Internal Walls	North Walls	40m ²	15w/m ²	600w	
Internal Walls	West Walls	175.68m ²	15w/m ²	26352w	
Roof	Roof	2480.60m ²	25w/m ²	62015w	
Lighting	Lighting	40	40	1600w	
People	People	30	60/80w/m ²	2400w	1800w
Spinning Machine	Machine	86	5700w	490200w	
Clearing Machine	Machine	7	1178.4	12448.8w	
Total				622122.08w	1800w

$$P = m/v$$

$$V = p \times m$$

$$= 15.07 \times 0.88$$

∴ Volume flow Rate = 13.2616

6. Conclusion and Recommendation

- Air conditioning has served us for many years. And having enjoyed every bit of its services, caution must be taken on its negative effects. Hence, this research has shown one of its deadliest side as to air condition related diseases. So that the information gathered can let us put in place good and rapid measures to curb its spread and effects on the textile industry.
- From all data analyzed, it could be seen that when the right temperature and humidity levels in factory are corrected and within the predetermined range, end breaks levels in the factory could be reduced from 212 to 84 marks in 24 hours at a temperature of 29°C and humidity of 34%.
- The quality of the yarn would also improve in production and the difficulties associated with spinning and weaving of the cotton would be minimized. Getting the air condition plant working properly and delivering the correct temperature and humidity level, the factory can make huge turn over in product and returns on investment would be higher.
- The Legionnaire will grow in water at a temperature of 20°C to 50°C. However, the bacteria reproduce at the greatest rate in stagnant waters at temperatures of 35°C to 46°C. Legionnaire disease, therefore, could be controlled and contained under these range of temperatures if the right maintenance practices are carried out in the plant.
- It is therefore recommended that education be conducted on the causes and effects and control of Legionnaire disease. All refrigeration technicians, mechanics, engineers and students must be taught about this disease.

5.2.1 Calculations 1

$$Q_s = 622122.08w$$

$$Q_L = 1800 w$$

$$Q_T = Q_s + Q_L$$

$$= 622122.08 + 1800$$

$$= 62399.08 + 1800$$

$$SHF = Q_s / Q_T$$

$$= 622122.08 / 62399.08$$

∴ SHF = 0.997115

5.2.2 Calculations 2

Supply Air temperature	=	15°C
Room temperature	=	20°C
Relative humidity	=	60%
Total heat	=	648.22
Hi	=	43Kj/Kg
H2	=	86Kj/Kg
Ah	=	86 - 43
	=	43Kj/Kg
Q	=	ṁ Δ h
ṁ	=	648.22/43
ṁ	=	15.07Kg/s
V	=	0.88 m ³ /Kg

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An Efficient Automated Timetable for Distance Education of the Open University of Sri Lanka

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Abstract- This paper presents an efficient automated timetable suitable for universities that follow the distance learning education methodology. This study generates a first semester automated timetable and shifts the weekday schedule of the faculty of Natural Science (NSC) at Open University of Sri Lanka (OUSL) to weekends and Fridays. The timetable was modeled considering all three levels. Initially, graph coloring approaches were used to derive course groups, and then those groups were assigned to available time periods using the Binary Integer Linear Programming (BILP) model. A growing number of student registration and introducing new courses yearly made this problem harder which also result in many variables and constraints to the model. The quality of the solution improves according to the date and the time slot allocated to the set of course groups. The model results in a feasible timetable that optimizes the effectiveness of the student's academic performances and it can be implemented with the lecture halls currently available in the faculty of NSC, The OUSL. Changes to this model can be done according to faculty requirements.

Index Terms- Course Timetabling, Graph Coloring, Integer Linear Programming

I. INTRODUCTION

Timetable is a primitive time management tool, which allocates certain resources over time to perform a collection of tasks. For instance, The Public Transportation timetable allocates public transport to certain time periods to assist passengers. There are a variety of timetables such as transportation timetables, working schedules, etc.... This research is based on university course timetabling which can be categories under academic timetables. It assigns course groups having no common students to certain time slots, according to the requirements of the institute. The university course timetable can be scheduled as a weekly or semester wise.

Timetabling is a lengthy process that involves several steps until it assigned courses to time periods. The timetabling problem should be converted to a mathematical model to get a conflict free timetable. Hard and soft constraints are the two categories of objectives imposed by the relevant institute. Hard constraints are compulsory. Those are the requirements that the timetable must follow to get a feasible timetable. Soft constraints are necessary but not essential to generate a feasible schedule. Since under real-world conditions, it's almost impossible to achieve all those requirements. A feasible timetable becomes optimum if it satisfies more soft constraints imposed by the user. The Faculty of NSC at OUSL does not possess an automated timetable and they conduct day schools even on weekdays. To achieve new requirements, they do minor changes to existing semester timetables each year.

OUSL deliver their courses for student through Open & Distance Learning methodology. Therefore, regular attendance at university is not essential for students. Hence, this educational environment motivates employers to follow degrees at OUSL.

However, NSC faculty offer courses under four levels. Those are level 03, 04, 05, and 06. To complete a general degree, students should follow level 03, 04, and level 05 courses. The Special degree students must follow, level 06 courses in addition to the other three levels. Each course can be identified using a unique course code. Instead of weekly lectures, OUSL conducts day schools. The duration of a day school is three hours and it is independent of the credit value of the course. Since day schools conduct only to clear the doubts students have on printed course material which OUSL staff provide when students register for a particular course.

As previously mentioned, the majority of their undergraduates are employers who have busy working schedules. So, weekdays day schools reduced student attendance which also leads to poor academic performances. This will negatively affect the effectiveness of OUSL degree programs and besides causes to drop the number of students register for programs. This research addressed this issue and shift the timetable to weekends.

This study intends to provide a feasible optimum weekend timetable to encourage students to attend day schools. This automated timetable also reduces the wastage of both physical and human recourses as much as possible.

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II. MATERIALS AND METHODS

Maple 12 mathematical software was used to implement the early mentioned mathematical model. Before defining an integer linear programming model, the graph colouring approach was used to originate conflict-free course groups (i. e each course group contains courses which followed by a different group of students). Then those course groups can be assigned to different time slots using the ILP model.

The graph colouring process takes courses as vertices and those are connected if courses have at least one common student. Consequently, adjacent vertices received different colours. Courses having a similar colour gather to the same group. A student who registered under the faculty of NSC can select a major subject and two minor subjects. For instance, students following Mathematics won't select Botany or Zoology as the other two subjects. Then these subjects can be placed in the same course groups.

In order to obtain course groups, graph colouring was applied to each level separately. Then those level-wise groups were used to draw another graph. Level wise course groups were considered as vertices and those groups were connected using edge only if those groups contain courses are in the same departments. So, each time slot of the resulted timetable will contain only one subject from each department. This procedure will avoid the difficulties obtained when allocating lecturers to the courses. Since OUSL has eight other regional centres additionally to the main campus, day schools should be conducted at those centres as well. it would be hard to assign lecturers to courses with their lesser number of academic staff in regional centres.

The model-

This is the Formulated binary integer linear programming model which defines the objective and the set of constraints. This model was solved using the branch and bound method. In this model k and t are positive integers which represent the number of course groups and number of available time slots respectively.

$$I = \{\text{Set of course unit groups in the first semester}\} = \{1, 2, 3, \dots, k\}$$

$$J = \{\text{Set of time periods}\} = \{1, 2, 3, \dots, t\}$$

Basic variable-

x_{ij} is the decision variable where $i \in I$ and $j \in J$. This model defines $k \times t$ number of decision variables.

$$x_{ij} = \begin{cases} 1 & \text{if } i^{\text{th}} \text{ course assigned to } j^{\text{th}} \text{ time period} \\ 0 & \text{otherwise} \end{cases}$$

ILP model is formulated as a minimization problem. Following objective function minimize the undesirability of assigning a group of courses to a time slot.

$$\text{minimize } z = \sum_{i=1}^k \sum_{j=1}^t x_{ij} p_j$$

p_j values represent the desirability of the assignment of a set of courses to the time slot j . Moreover, higher p_j values imply less desirability to assign a course group j^{th} period.

NSC faculty conduct at least four day school of three hours duration for each course. Therefore, for one day, we can fix only two groups as DSM (Day school morning, 9.00 am – 12.00 noon) and DSA (Day school afternoon, 1.00 pm – 4.00 pm). When assigning p_j values to each time slot minimum values were allocated to Saturdays and Sundays in order to shift the weekday's timetable to the weekends. Fridays were also considered to avoid getting a lengthy semester. When considering Friday's minimum values were allocated to evenings. Each semester goes through 16 weeks so when creating timetable four weeks were considered and allocate course groups to those time slots. So that timetable was repeated four times to obtain the complete semester timetable. Table 1 shows the allocation of p_j values.

Table 1: Coefficient of the objective function for quarter of first semester timetable

Time Periods	Saturday	Sunday	Friday
9.00 am-12.00noon	1	9	19
1.00 pm-4.00 pm	2	10	17
9.00 am-12.00noon	3	11	20
1.00 pm-4.00 pm	4	12	18
9.00 am-12.00noon	5	13	21
1.00 pm-4.00 pm	6	14	
9.00 am-12.00noon	7	15	
1.00 pm-4.00 pm	8	16	

Constraints-

The model is solved subject to the following hard constraints. The feasible solution must satisfy these constraints.

$$\sum_{j=1}^t x_{ij} = 1 \quad \forall i \in I \rightarrow C_1$$

This constraint ensures that all planned courses are assigned to timeslots. This would result k number of constraints.

$$\sum_{i=1}^k x_{ij} \leq 1 \quad \forall j \in J \rightarrow C_2$$

Set of constraints C_2 assigns exactly one group of courses to a time period. This would generate t number of constraints and automatically provide conflict-free solution.

$$0 \leq x_{ij} \leq 1 \quad \forall i \in I, \text{ and } \forall j \in J \rightarrow C_3$$

C_3 is to limit x_{ij} values to a positive value in between 1 and 0, while C_4 confirms the integer solutions.

$$x_{ij} \text{ is an integer } \forall i \in I \text{ and } \forall j \in J \rightarrow C_4$$

This model results $t \times k$ binary integer solutions for a quarter of the first semester timetable.

III. RESULTS AND DISCUSSION

Details for this research were gathered from the Natural science dean office and from the OUSL prospectus of 2017-2018. NSC faculty of OUSL has six departments and they offer the following seven types of courses. Botany (BYU), Zoology (ZYU), Mathematics (ADU: Applied mathematics, PEU: Pure mathematics), Computer Science (CSU), Physics (PHU), and Chemistry (CYU).

The first graph created using those departments, this would result set of subjects that can be scheduled in the same time slot for each level.

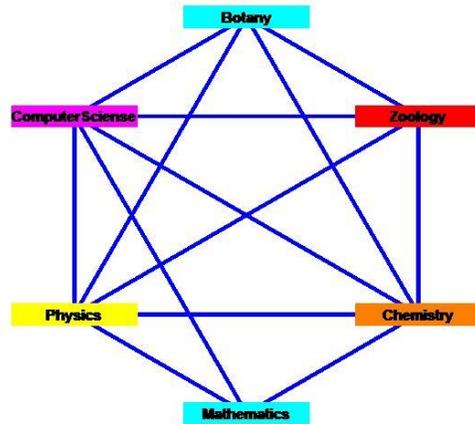


Figure 1: Groups of the Departments

Those groups are,

- 1. Botany, Mathematics
- 2. Computer Science
- 3. Zoology
- 4. Physics
- 5. Chemistry

Subjects in the same color can be scheduled simultaneously. For instance, it is possible to schedule Mathematics course units together with the Botany or Zoology subjects.

However, the faculty of NSC offers 56 courses. A graph coloring computer program was used to get conflict-free course groups for each level separately. It resulted the following graphs. Level 03, 04, and 05 have 08, 12, and 21 course groups respectively.

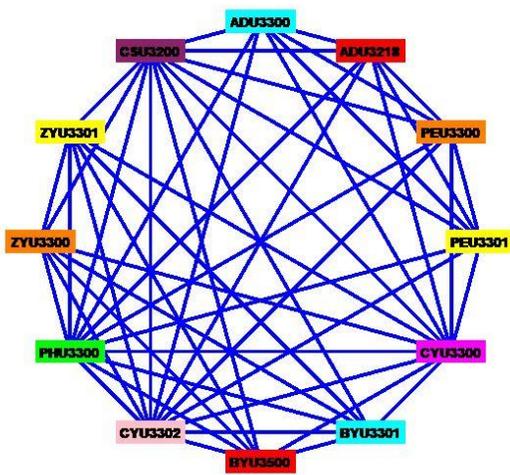


Figure 2: Groups of the Level 03

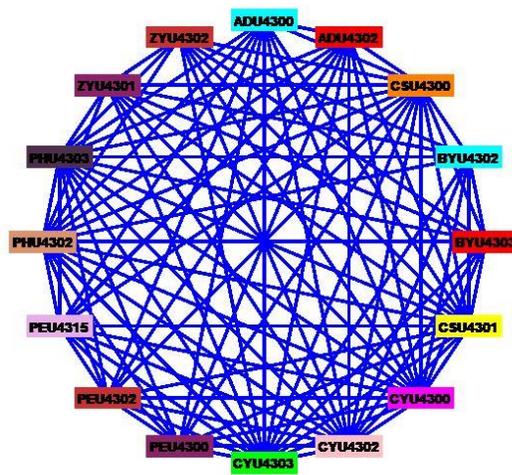


Figure 3: Groups of the Level 04

Subject to;

$$\sum_{i=1}^{21} x_{ij} \leq 1 \quad \forall j \in J$$

$$\sum_{j=1}^{21} x_{ij} = 1 \quad \forall i \in I$$

$$0 \leq x_{ij} \leq 1 \quad \forall i \in I \text{ and } \forall j \in J$$

$$x_{ij} \text{ is an integer } \forall i \in I \text{ and } \forall j \in J$$

Since there are 21 different course groups with 21 of three hours' time periods, the model would result array of (21 × 21) 441 elements.

Table 2 is the model timetable for a quarter of the first semester. This timetable generated for general degree students using the MAPLE12 program. In the new timetable, students do not have day schools on weekdays other than Fridays. It is desirable since most of the students do not prefer lectures on weekdays.

Table 2: Timetable of First Quarter of the First Semester

Time Periods	Saturday	Sunday	Friday
9.00 am-12.00noon	[CSU5304, PHU4303, PEU3301, ZYU3301]	[CSU5304, PHU4303, PEU3301, ZYU3301]	[PEU5302, ZYU5302]
1.00 pm-4.00 pm	[CSU4300, CYU3300, ADU5300, BYU5301]	[PHU5305]	[CYU5300]
9.00 am-12.00noon	[CSU4301, CYU3302, ADU5302, BYU5302]	[CSU3200, CYU5301, ADU4300 BYU4302]	[CSU5315]
1.00 pm-4.00pm	[CSU5302, PHU4302, PEU3300, ZYU3300]	[PEU5304 ZYU5307]	[PHU5318]
9.00 am-12.00noon	[CSU5301, CYU4303, ADU3218, BYU3500]	[CYU4300, PHU3300, ADU5318 BYU5303]	[PHU5312]
1.0 pm-4.00pm	[CSU5300, CYU4302, ADU3300, BYU3301]	[CYU5303, PEU4300, ZYU4301]	
9.00 am-12.00noon	[PEU4315, PHU5302]	[PHU5303]	
1.00 pm-4.00pm	[CYU5302, ADU4302, BYU4303]	[PEU5305 ZYU5313]	

Table 2 shows the distribution of day schools in the first quarter of the first semester. So complete timetable received after repeating the quarter semester schedule would assign each course to four time slots. It reveals that each student in the faculty has two day schools before the Open Book Test (OBT) and one day school before the No Book Test (NBT) and Revision day school before the final exam. This implies that day schools are properly distributed. OBT and NBT exams didn't take to account assuming that those exams are conducted after office hours on weekdays and (4.15 pm-5.15 pm). Also, each time slot contains one course from one subject hence it would be convenient for them to assign lecturers for courses without conflict.

However, those available Friday's time slots can be used to schedule level 6 courses or to conduct workshops and additional day schools.

IV. CONCLUSION

This model is able to shift all NSC first semester day schools to weekends and Fridays only. Further, it is possible to implement the result with currently available lecture halls and academic staff. Hence this model helps to utilize both physical and human resources in

the faculty successfully. The problem was solved effectively for the first semester which can be extended to the second semester. This timetable would act as a basis for other faculties as well.

However, as a further development one can find the complexity of the computer programme used to generate this timetable. Moreover, the ordering of course unit groups are taken to be arbitrary since one cannot give preferences to the subjects. But at the department level, they have their own preferences which are difficult to gather. If some ordering method can be applied, one would obtain more efficient results.

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Corporate Social Responsibility Disclosure And Good Corporate Governance On Tax Avoidance

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Abstract: Undang-undang No. 36/2008 regarding Income Tax showed that the greater the profits from the company, the greater the tax to be paid by the company. Social and environmental responsibility in the Limited Liability Company Act No. 40 of 2007 is defined as the company's commitment to participate in the sustainable economic development to improve the quality of life and environmental benefits the company, the local community and society in general. The difference is a tax administered by the central government and the local governments which are then distributed to the general public, while the cost of implementing CSR is managed by a company and then distributed to the general public. This research was conducted on the manufacturing sector in Indonesia with the 2017-2018 study period. The results show that the disclosure of CSR affect negatively to the aggressiveness of tax, while good corporate governance doesn't affect the aggressiveness of tax.

Keywords : CSR, *corporate governance*, tax aggressiveness.

INTRODUCTION

Tax is a mandatory contribution from the people, as stated in Law Number 28 of 2007 concerning general provisions and taxation procedures of article 1 paragraph 1 which reads "tax is a mandatory contribution to the State owed by individuals or compelling bodies under the Act Invite

Indonesia is one of the countries whose income relies heavily on the tax sector. Therefore, the issue of tax revenue must be used as a strategic discourse, to increase national development through increased state revenue in the tax sector. Because, from year to year, the progress of the tax sector is relatively low.

Law Number 36 Year 2008 regarding Income Tax shows that the greater the profit the company gets, the more tax the company will pay. Increased tax aggressiveness by companies is nothing but a burden on corporate profits, on the other hand causes state revenues to increase. Efforts made by companies in streamlining their tax burden are also called tax management. The objectives of tax management can be achieved by tax aggressiveness, implementing tax obligations, and controlling taxes. Therefore, tax shelter, tax aggressiveness, and tax avoidance are some of the elements that can be done in tax management efforts. Although it has been stipulated in the tax law and has special sanctions, there are still many companies that commit tax violations.

Today, an issue which is quite lively to be discussed is social responsibility or corporate social responsibility (CSR). This CSR concept causes companies not only to have obligations relating to tax aggressiveness for national development and general welfare, companies themselves are required to have responsibility for their social and environmental conditions. It seems that in Indonesia today awareness of the importance of protecting the environment and social relations has begun to develop.

Semiring (2005) states that companies have broader responsibilities, companies no longer only provide financial reports to owners of capital and seek profits for shareholders. This is due to an increase in public awareness of the problems that arise such as social problems, pollution, resources, waste, product quality, product safety level and labor status of the company cycle. Therefore, one of the information that is now quite attractive to stakeholders is information related to the company's relationship and its environment.

Social and environmental responsibility in Limited Liability Company Law No. 40 of 2007 Article 1 Number 3 is defined as the company's commitment to participate in sustainable economic development in order to improve the quality of life and the environment that is beneficial, both for the Company itself, the local community and society in general. From this definition it can be stated that taxes and CSR are both aimed at general welfare. But the difference is that taxes are managed by the central and regional governments which are then distributed to the general public while the cost of implementing CSR is managed by the company and then distributed to the general public (Kurniati and Mita, 2012). In addition, taxes and CSR implementation costs are expenses that must be incurred by the company. Most companies consider tax as an unfavourable burden for the company because it is not in accordance with the company's goals, which is to make the maximum possible profit to attract investors.

Research that has been conducted on the relationship between CSR disclosure and tax include Lanis and Richardson's research. Lanis and Richardson (2011) conducted an empirical analysis to find out whether CSR activities had an impact on corporate tax aggressiveness. Research conducted to measure CSR activities is the CSR index that applies in Australia. Although

there is some debate about using the CSR disclosure index as a measure of a company's CSR activities, Clarkson et.'s latest research. al., (2008) found a positive relationship between corporate environmental activities and the level of environmental and social disclosure. In addition, there are also studies that find results that are inversely proportional to Lanis and Richardson. Davis et al., (2013) who conducted research on companies in the United States that were registered with Compustat in 2002-2010 found that there was a negative relationship between CSR and Effective Tax Rate. In other words, CSR is positively related to tax aggressiveness. Thus, high social activities do not necessarily guarantee companies to pay high taxes as well.

Another issue that is no less important that can reduce corporate tax aggressiveness is Good Corporate Governance. This GCG began to receive special attention after the 1997-1998 financial crisis in Indonesia. The condition of GCG in Indonesia now is not much different from what happened before. In 2010, Governance Metrics International issued a rating of good corporate governance, and Indonesia ranked 37 out of 39 countries surveyed. This shows that until now the condition of GCG still needs improvement, moreover the GCG chosen by the company can influence the company's taxation policy. An effective corporate taxation policy can support a company's performance to generate profits in accordance with the interests of shareholders. Therefore the topic of GCG still needs to be the main focus of research in addition to the issue of social and environmental responsibility.

The National Committee on Governance Policy states that corporate organs, which consist of General Meeting of Shareholders (GMS), the Board of Commissioners and Directors, have an important role in the effective implementation of Good Corporate Governance. An important element of the General Meeting of Shareholders is the shares owned by the blockholders because the shares owned are relatively large, so that they can exert considerable influence in the company's decision making. The Board of Commissioners is the organ of the company that supervises and provides advice to the Directors to ensure that the company is managed with the company's aims and objectives. To increase the quality of supervision, an independent board of commissioners is needed, this is supported by the Decree of the Directors of PT. Indonesian Securities Exchange No. Kep-305 / BEJ / 07-2004, Rule Number IA concerning Listing of Shares and Other Equity Securities other than Shares Issued by the Company Noted, which states that the number of Independent Commissioners is at least 30% of all members of the Board of Commissioners.

THEORETICAL REVIEW (BOLD, CAPITAL 14 pt)

Tax Aggressiveness

Minimizing tax obligations can be done in various ways, both those that still meet tax requirements and those that violate tax regulations. The terms often used are tax evasion and tax avoidance. Sophar Lumbantoruan in his book tax accounting (1996: 489) explained the definition related to these two terms. Tax evasion is tax avoidance by violating the provisions of tax regulations. Tax avoidance (tax avoidance) is tax avoidance by complying with existing regulations.

Tax aggressiveness is a vulnerable action by large companies throughout the world. Hlaing (2012) defines tax aggressiveness as a tax aggressiveness activity of all companies involved in efforts to reduce the effective tax rate. Tax aggressiveness is an act of reducing taxes that are of public concern because these actions are socially irresponsible actions that harm society and the government.

Corporate tax can be linked to public attention if the payment of this tax has implications for the wider community as opposed to company operating costs. Avi-Yonan (2008) revealed that the aim of minimizing the amount of tax paid by companies is to be understood and will show some ethics, community or other stakeholders in the company. Jimenez (2008) states that recent empirical evidence shows that tax aggressiveness is more pervasive in weak good corporate governance. In addition, Slemrod (2004) in Balakrishnan et. al. (2011) argues that tax aggressiveness is a more specific activity, which includes transactions whose main purpose is to reduce corporate tax obligations. Balakrishnan et. al. (2011) stated that tax-aggressive companies are characterized by lower transparency.

Hanlon and Heitzman (2010) define the aggressiveness of corporate income tax (often referred to as tax avoidance) as the most recent level of the spectrum of a series of tax aggressiveness behaviors. Aggressive transactions and decision making might potentially be a problem of tax avoidance or tax evasion.

Corporate Social Responsibility

Marnelly (2012) states that there are two types of CSR concepts, namely in a broad and narrow sense. CSR in a broad sense is closely related to the goal of achieving sustainable economic activity. Sustainability of economic activities is not only related to social responsibility but also concerns corporate accountability to the community and the nation and the international world. CSR in the narrow sense can be understood from several regulations and expert opinions.

Some regulations that define CSR include the 2007 Limited Liability Company Law article 1 number 3 which states that social and environmental responsibility is the company's commitment to participate in sustainable economic development in order to improve the quality of life and the environment that is beneficial, both for the Company itself, the community local, as well as the community in general and the Investment Act 2007 article 15 letter b which states that corporate social responsibility is the responsibility inherent in every investment company to continue to create a harmonious, balanced, and in accordance with the environment, values, norms, and local culture.

Good Corporate Governance

A good corporate governance will be able to work optimally if the principles of Good Corporate Governance are applied in every aspect of the business and in all levels of the company. KNKG states that there are five principles of Good Corporate

Governance, namely transparency, accountability, responsibility, independence and fairness and equality. KNKG further explains the basic principles of each principle. As transparency states that every company is required to disclose material and relevant information about related matters that can influence the decision making of shareholders, creditors and other stakeholders. The principle of accountability has the principle that transparent and reasonable company performance can be achieved with performance that is managed properly, measured and in accordance with the interests of the company while taking into account the interests of shareholders and other stakeholders. The principle of responsibility explains that each company must comply with every statutory regulation and carry out responsibilities to the community and the environment. The principle of independence requires companies to be managed independently so that each organ of the company does not dominate each other and cannot be intervened by other parties. The last principle, fairness and equality, signals the company to always pay attention to the interests of shareholders and other stakeholders with fairness and equality

Effects of CSR Disclosures on Tax Aggressiveness

Stakeholder theory states that the company in carrying out its operations, must consider all parties affected by the company's operational activities. In this case, the company does not only prioritize the interests of shareholders, but also concerns the interests of the community, government, consumers, suppliers, analysts, and so on. One form of company attention to stakeholders is to obey and pay taxes accordingly.

Lanis and Richardson (2011) state that if companies are considered to avoid taxes, it is generally not considered paying their "fair shares" in the form of corporate income tax to the government which is used to help underwrite financing of public goods. In addition, Lanis and Richardson (2011) also argue that in paying taxes, companies should have some ethical considerations for the community and other stakeholders. Therefore, tax aggressiveness by companies can be considered socially irresponsible.

The environment and society simply influence the performance of a company. One form of communication between the community and the company is through corporate social responsibility or CSR in accordance with the theory of legitimacy. This form of social responsibility aims to attract the attention of the community so that the company has a good and acceptable impression in the community. Legitimacy requires companies to disclose CSR and make a profit. A company can be said to have successfully carried out legitimacy if it is able to meet the expectations of society through the implementation of corporate social responsibility.

One form of company obligation is paying taxes. By paying taxes, companies participate in contributing to national development in order to prosper the lives of the people. This is similar to the opinion of Harari, et. al. (2012) in Yoehana (2013) states that from a community perspective, taxes can be seen as dividends paid by companies to the community as a reward for using available resources. If the company avoids the proper tax payment, the company may be subject to witnesses or punishment.

Tax aggressiveness or better known as minimizing tax vulnerability is carried out by large companies throughout the world. Therefore, to generate public trust, it is important for companies to carry out their social responsibilities through disclosure of annual reports. Avi-Yohan (2008) in Lanis and Richardson (2012) states that corporate tax can only be associated with CSR if the tax payments made by the company do have implications for the wider community. But in general, companies feel burdened with the many responsibilities that exist, so that minimizing taxes has become one of the options to ease responsibility. Based on the description above it is clear that companies that carry out tax aggressiveness will minimize corporate tax payments for profit, the hypothesis of this study is:

H1: CSR disclosure has a negative effect on tax aggressiveness

The Effect of Good Corporate Governance Management on Tax Aggressiveness

Seeing the condition of good corporate governance in Indonesia, it can be said that good corporate governance in Indonesia is still lacking when compared to other countries. Therefore, shareholders still have doubts about the performance of management in maximizing profits and in making tax aggressiveness decisions. According to Shleifer and Vishny (1986); Jensen (1993) in Lanis and Richardson (2011) the existence of blockholders adds supervisory incentives to management. This is because blockholders have a significant influence when compared to minority shareholders.

This better supervision causes the tax aggressiveness of the company to be more effective and so does the amount of tax paid. The National Committee on Governance Policy (KNKG) stated that shareholders must realize that in exercising their rights and responsibilities they must also pay attention to the survival of the company. Therefore, good corporate governance will oversee management activities, one of the manifestations is a reduction in tax aggressiveness, because with better tax aggressiveness, the value of the company will indirectly increase and will attract other investors to provide funds to the company. This can help maintain the viability of the company. Based on the description above, the hypothesis of this research is:

H2: Good corporate governance has a positive effect on tax aggressiveness

METHODOLOGY

The research in this thesis uses a quantitative approach by testing hypotheses. The operational definitions of the variables in this study are:

1. Tax Aggressiveness

Tax aggressiveness is one of the ways undertaken by companies to minimize the tax burden to be paid in a legal or illegal way. Effective Tax Rate (ETR) is the main proxy in this study. ETR represents the percentage of total load

To know the existence of tax aggressiveness can be seen from the low ETR value (Lanis and Richardson, 2013). A low ETR indicates lower income tax burden than pretax income. Income tax paid by the company from all total income before tax. ETR was measured using the Lanis and Richardson (2012) proxy model because the most widely used. ETR is count by income tax expense divided by income before tax.

2. Corporate Social Responsibility

CSR in this study will be measured using a check list that refers to the disclosure indicators used by Sembiring (2005) because it is more in line with the state of the company in Indonesia. This is because the CSR disclosure situation in Indonesia is still general in nature and has not yet been deeply applied. This indicator consists of seven categories, namely the environment, energy, health and safety of the workforce, other labor, products, community involvement, and the public. The number of items expected by manufacturing companies is 78 items consisting of environmental categories (13 items), energy categories (7 items), labor health and safety categories (8 items), other categories of labor (29 items), product categories (10 items), community involvement categories (9 items), and general categories (2 items).

This measurement is done by matching the items on the check list with the items disclosed by the company. If an item is disclosed then a value of 1 is given, if the item is not disclosed then a value of 0 is given in the check list. After that, the index disclosure results will be calculated with the CSRI.

3. Management Compensation

Compensation is the total wage given to employees for services provided to the company. This study uses Irawan and Farahmita's (2012) method of calculation, which is the natural logarithm proxy following the total value of compensation received by key management for one year. Management compensation data is contained in the disclosure of Notes to the Company's Financial Statements.

4. Independent Commissioner

An independent board of commissioners is one that has no affiliation with the directors or board of commissioners and does not serve as a director of a company related to the owner's company according to regulations issued by the IDX. In this study, the variable independent commissioners will be measured by the percentage of the number of independent boards of commissioners divided by the total number of company boards.

5. Ownership of Directors

Ownership of directors is share compensation granted through directors' share ownership (Irawan and Farahmita, 2012). Measurement of share ownership of directors in this study uses the percentage of share ownership owned by the board of directors until the end of the year.

6. Blockholder Ownership

Blockholder ownership is the ownership of companies owned by other institutions outside the company, such as banks, insurance companies, investment companies, pension funds, investment trusts, mutual funds, and other investment groups. The blockholder ownership variable is measured by using the proportion of shares owned by outside parties other than the management of the company and the parent entity or subsidiary of more than 5% at the end of the year measured in percentage of the number of shares outstanding.

Population and Sample

According to Sugiyono (2006: 215), population is a generalization area that consists of objects or subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions. In this study the population used is companies incorporated in the manufacturing sector that are consistently listed on the Indonesia Stock Exchange (IDX) during the study period, namely the 2017 and 2018 periods. The selection of the four-year period aims to obtain the latest data and is expected to obtain good results in explaining the factors that affect tax aggressiveness. The researcher considers that the choice of manufacturing companies is due to the large number of companies in a population and the relatively more companies having an impact on the environment compared to service or trading companies. Problems in manufacturing companies are also more complex in tax matters, so it is expected to be better able to describe the state of companies in Indonesia. According to the IDX, the sectors classified as manufacturing companies are companies engaged in the basic and chemical industries, various industries, and consumer goods industries.

THE RESULTS OF STATISTICAL TESTS

Factor Analysis

To measure good corporate governance, this study uses management compensation, independent commissioners, managerial ownership and blockholder ownership. These four indicators are used to form a composite variable, namely good corporate governance. From appendix 2 it can be seen that the value of Keisyer-Meyer Olskin (KMO) has shown results of 0.538 which means greater than 0.5. Likewise, the value of Bartlett's Test of Sphericity shows a significance value of 0,000, which means less than 0.05. The following is the SPSS processed table:

Table 1
KMO and Bartlett's Test

<i>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</i>		0,538
	Approx. Chi-Square	50,725
<i>Bartlett's Test of Sphericity</i>	Df	6
	Sig.	0,000

Source: Processed by SPSS, 2020.

On the basis of the Keisyer-Meyer Olskin (KMO) value of Bartlett's Test of Sphericity, thus indicators of management compensation, independent commissioners, managerial ownership and blockholder ownership can be attributes that form variables of good corporate governance mechanisms.

Classical Assumption Testing

Regression testing conducted on the regression equation will be tested on classical assumptions consisting of normality test, muticolinierity test, heterokedasticity test and autocorrelation test. Following are the test results from the SPSS:

a. Normality test

The normality test results can be seen in table below:

Table 2
Normality Test

Model	<i>Asymp. Sig (2-tailed)</i>
1	0,161

Source: Processed Results of SPSS, 2020.

From the classic assumption test table it can be seen that the significance level of one sample Kolmogorov-Smirnov shows the number 0.161, which means it is greater than 0.05 so it can be concluded that the data is normally distributed. This is supported by the following table, the points approach the diagonal line, which means the data has been normally distributed.

Multicollinearity Test

Multicollinearity test aims to test whether the regression model found a correlation between independent variables (independent) (Ghozali, 2016: 105-106). Multicollinearity can be seen from the value of tolerance and its opponents as well as the variance inflation factor (VIF). Both of these measurements indicate which of each independent variable is explained by other independent variables. From the multicollinearity test table it can be seen that the VIF value for variables is less than 10 for variables in the regression model 1. It was concluded that the regression model 1 does not have multicollinearity between the independent variables in the regression model, because the VIF value <10 and tolerance value > 0.1 are meaning that there is no multicollinearity. Multicollinearity test results can be seen in the following table.

Table 3
Variance Inflation Factor (VIF) Test Results

Variabel	Tolerance	VIF	Kesimpulan
CSR	0,971	1,030	Bebas Multikolonieritas
GCG	0,971	1,030	Bebas Multikolonieritas

Source: Processed Results of SPSS, 2020.

Heterokedastisitas test

From the heteroscedasticity graph produced from SPSS, it can be seen that the plot graph between the predicted value is ZPRED and the residual value is SRESID. There is no specific pattern, and the pattern of dots spread on the scatterplot graph so that it can be concluded that heterocedasticity does not occur.

Autocorrelation Test

The autocorrelation test aims to test whether in the linear regression model there is a correlation between the error of the intruder in the t period and the error of the intruder in the t-1 period (before). The regression model in this study produced the Durbin Watson value was 2.008 with the Durbin Watson table value was 1.7432 (k = 2, n = 128) and the 4-du value was 2.2568. Then it can be concluded that the value of 2.008 is in the interval 1.7432 <2.008 <2.2568, which means the regression equation of this study is free from autocorrelation.

DISCUSSION (BOLD, CAPITAL 14 pt)

The Effect of Corporate Social Responsibility Disclosure on Tax Aggressiveness

Based on the results of the regression model, the CSR disclosure variable has a negative coefficient of -0.244 with a significant level of 0.003, so the results of testing the first hypothesis can be seen that the disclosure of social responsibility reflected by the disclosure index of Corporate Social Responsibility (CSR) has a negative influence on tax aggressiveness . In other words, this explains that the CSR disclosure index has a negative effect on corporate tax aggressiveness, because companies pay a small amount of tax too. Companies that are committed to implementing CSR must participate in sustainable economic development, because CSR is a corporate social activity aimed at the benefit of internal and external parties of the company.

The results of this study are in line with the results of research conducted by Lanis and Richardson (2011) which states that the CSR disclosure index has a negative and significant effect on tax aggressiveness. Lannis and Richardson (2011) indicate that companies that carry out CSR with a strong mandate, will be more inclined to not be aggressive in taxation actions because this can affect the views of society as a whole. The results of this study are also consistent with the results of the study of Davis et.al, (2013) which states that the CSR disclosure index has a negative effect on corporate tax payments. So companies that have good CSR disclosure do not always pay taxes with "fair value". Davis et.al, (2013) said that from the results of the study, it can be concluded that the average manager and other stakeholders do not see tax payments as an important part of corporate social action towards the community. Davis et.al, adding that with the available evidence, this also shows that the reduction in paying taxes does not mean not being socially responsible.

The results of this study indicate that in Indonesia, the companies and decision makers in it do not view tax payments as an aspect that has a large impact on their social activities as Davis et.al (2013) said. In addition, the application of CSR in Indonesia which only became a "trend" in 2007 after the issuance of Limited Liability Company Law No.40 Article 74 Paragraph 1. Nurkhin (2007) also added that the implementation of CSR in Indonesia was still general and voluntary in nature) so this shows that the Indonesian people still lack knowledge about CSR, so that active tax aggressiveness from the company will not be seen as an irresponsible social responsibility, and will not damage the company's good name. This has caused decision makers in manufacturing companies in Indonesia to continue to take tax aggressiveness in quite a lot of frequency.

The Effect of Good Corporate Governance on Tax Aggressiveness

Based on the results of the regression model, the management compensation variable has a positive coefficient of 0.005 with a significant level of 0.625 to the ETR, so from the results of the second hypothesis testing it can be seen that good corporate governance does not significantly affect the aggressiveness of corporate taxes. The results of this test can draw the conclusion that the second hypothesis (H2) is rejected.

To measure good corporate governance, this study uses management compensation, independent commissioners, managerial ownership and blockholder ownership. These four indicators are used to form a composite variable, namely good corporate governance. Inadequate governance policies undertaken by companies, as well as a lack of government attention to the implementation of good corporate governance is one measure of the weakness of corporate governance in Indonesia. The results of good corporate governance research are based on weak governance in Indonesia, this can be supported from several previous studies, namely:

Management compensation which is a remuneration provided by the company to management in financial or non-financial forms, aimed at aligning objectives and increasing motivation has proven to be inappropriate for tax aggressiveness. Irawan and Farahmita (2016) who examined the relationship of director compensation to tax aggressiveness. There is a slight difference in the use of variables, the results of aggressiveness compensation in this study are not significant, while the director's compensation variable in Irawan and Farahmita (2016) has a significant effect on tax aggressiveness. This insignificant result shows that most companies in Indonesia who hope that giving compensation to management can increase the effectiveness of tax management is wrong. Because, giving compensation to the company's key management whether in large amounts or in small amounts is not an effective way to increase the effectiveness of tax aggressiveness. Other mechanisms are considered more appropriate to manage corporate tax management.

Independent commissioners are one of the important corporate governance mechanisms in a company because they are expected to be a counterweight and at the same time become supervisors in a public company. From the definition and role of the independent commissioners above, it can be said that the results of the regression in this study indicate that the function of independent commissioners does not run optimally in Indonesia. The number of independent directors can increase supervision and can reduce the activity of tax aggressiveness is not in accordance with company policies and regulations . This insignificant result indicates that most independent commissioners at companies in Indonesia do not work optimally. This is supported by the insignificant results on this independent commissioner variable which is the same as the results obtained by two previous studies namely, Lanis and Richardson (2011) and Annisa and Kurniasih (2016) which states that the problem of independence and capability of commissioners is something that is very basic, but in practice in Indonesia, the appointment of commissioners is usually based on awards, family relationships, or other close relations, so this shows that in Indonesia the role of independent commissioners in terms of supervision does not work as it should.

Managerial ownership is a form of compensation to company management in the form of share ownership. From this definition, share ownership which is one form of compensation, can be said to have the same purpose as granting compensation. However, the results of this study indicate that shareholding by directors has not been successfully applied in Indonesia to align the goals of directors and shareholders. The results of statistical data related to insignificant ownership of directors indicate that the greater proportion of company shares owned by directors or the smaller proportion of shares owned by directors in a company does not significantly affect the effectiveness of a company's tax aggressiveness. Directors who act as decision makers should tend to do tax aggressiveness when they share in the ownership of the company. This is because effective tax aggressiveness will indirectly increase the value of the company and the value of the company's shares. In the end it will benefit the director too. Several previous studies have proven that management ownership of shares will reduce the amount of corporate tax payments. The results of this study indicate that giving the proportion of share ownership to the director is no longer a solution to increase tax aggressiveness. There are several factors that cause the ownership of directors to no longer be a significant variable in influencing tax aggressiveness activities. Changes in tax rates in 2010 could be one of these factors. A decrease in the company's tax rate to 25% causes the payment of corporate taxes to be smaller, this causes most directors and management of the company to reduce tax aggressiveness activities. So, big or small proportion of shares owned by directors no longer have a significant influence on the tax aggressiveness of the company.

Blockholder ownership as an ownership of outsiders with a percentage of ownership above 5% actually helps to add incentive to supervision of the company, however, similar results are obtained as other corporate governance mechanisms in this study. Blockholders have not yet demonstrated their role as boosting quality of supervision in companies in Indonesia. This result is the same as the results obtained by Lanis and Richardson (2011) who also found that ownership of blockholders does not significantly affect tax aggressiveness, because ownership of blockholders ownership by majority shareholders in influencing tax aggressiveness when compared with other corporate governance mechanisms. This relationship is due to the National Governance Policy Committee (KNKG) states that shareholders must realize that in carrying out their rights and responsibilities must also consider the survival of the company. Blockholders who have greater influence compared to minority shareholders will be one of the most powerful influences in maintaining the survival of the company. Therefore, blockholders who have greater influence than minority shareholders will try to oversee management activities, one of them with better tax aggressiveness.

CONCLUSION (BOLD, CAPITAL 14 pt)

Disclosure of social responsibility reflected by the index of Corporate Social Responsibility (CSR) disclosure has a negative effect on corporate tax aggressiveness, so the hypothesis is accepted. Companies that carry out CSR with a strong mandate, will be more likely not to be aggressive in taxation actions because this can affect the views of society as a whole. The implementation of CSR in Indonesia which only became a "trend" in 2007 after the issuance of Limited Liability Company Law No.40 Article 74 Paragraph 1. Nurkhin (2007) also added that the implementation of CSR in Indonesia was still general and voluntary in nature so that This shows that the Indonesian people still lack knowledge about CSR, so that active tax aggressiveness from the company will not be seen as an irresponsible social responsibility and will not damage the company's good name. This has caused decision makers in manufacturing companies in Indonesia to continue to take tax aggressiveness in quite a lot of frequency.

Good corporate governance does not affect the tax aggressiveness, so the hypothesis is rejected. Weak corporate governance in Indonesia as measured in this study uses management compensation, independent commissioners, managerial ownership and blockholder ownership due to the lack of good governance policies implemented by the company, as well as the lack of government attention to the implementation of good corporate governance.

For further research, it is better to use more expanded samples besides the manufacturing sector listed on the Indonesia Stock Exchange, so that the results of the study are able to describe the situation in Indonesia. For further research, it can use CSR indicators in addition to the Sembiring indicator and also a proxy other than ETR to measure tax aggressiveness, in order to produce relevant results. For the Government, it is hoped that the government can become input for the renewal of regulations in the field of taxation by considering all aspects of the company's activities, one of which relates to social responsibility activities or corporate social responsibility. For companies, it is hoped that companies in Indonesia will continue to pay attention to the impacts resulting from the tax management efforts undertaken. Companies must be able to produce more than the cost of tax management. In addition, it is expected that the increase in effectiveness and efficiency of tax aggressiveness carried out does not harm the community and the government as a whole, and still pay attention to the principle of sustainability.

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Effect of Herbicides on Living Organisms in The Ecosystem and Available Alternative Control Methods.

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Abstract- Herbicides are used in agricultural areas to reduce harmful of weeds. Herbicides could decimate some weeds and slow down growth in others. Using herbicide has increased significantly since the mid-20th century. In case that herbicides are not used, significant quantitative and qualitative losses will have occurred in agricultural production. However, the side effects caused by the wide and irrational use of herbicides threaten the environment and human health. Although herbicides are the least harmful among pesticides, many studies have shown the serious negative effects of herbicides on the environment and human health. Every year a list of herbicides that cause cancer or leave large residues in the soil and water are published. However, many herbicides have been banned, but only after they have been used in tons and causing environmental pollution. The chemical structure of herbicides degrades quite slowly in nature, which causes its accumulation in the soil and the environment. The effects of these herbicides have reached rivers, lakes, seas and oceans. Also, the effect of chemically degradation herbicides on living organisms under different environmental conditions is still unknown. Due to the widespread use of herbicides, it also negatively affects the use of traditional control methods, which can be also effective in some cases. In this article, some alternative control methods that can reduce the use of herbicides and reduce some of the herbicide's harm to the living organisms of the ecosystem will be included.

Index Terms- Herbicide, Environment, Alternative, Control Methods.

I. INTRODUCTION

Dinitrophenols (DNOC) and Cresols started to be used in 1932, and synthetic hormone-structured herbicides (2,4-D, 2,4-DP, etc.) in 1941. The use of chemical compounds for weeds control has spread rapidly since the late 19th century, and its use has reached the maximum level with the advancement of biochemistry and organic chemistry sciences since the middle of the 20th century. Chemical compounds that eliminate weeds or prevent the growth of weeds are called herbicides. The chemical substances that show the main effect on weeds are called the active substances, and the substances added to facilitate its use and increase its effectiveness are called fillers. All of the herbicides used for agricultural purposes consist of organic substances, namely C, H₂, and O₂. Due to the high number of herbicides used in agricultural production, they are divided into groups according to their usage time, function, or

chemical structure. In Turkey, the aim of herbicides using is not to completely destroy weeds, but to reduce the weeds population and to prevent it to compete with crops (Kraehmer, 2012; Güncan, 2013). In a 20-year study conducted in Denmark, it was reported that 80% of 200 weed species grown in the cultivated fields are too weak to compete with the crops and therefore do not affect the yield (Andreasen et al., 1996). In addition, weeds contribute positively to the ecosystem by contributing to biodiversity. Weeds prevent soil damage through erosion that may occur after harvest. The presence of weeds in the soil contributes to the continued life of microorganisms and insects, it also provides habitats for insects used in biological control and it is an important source for bees to use its to produce honey. Some weeds are used as human food sources, some species are used in medical treatment and medicine production. It is also used as animal feed and as a source of genes in ornamental plants. Therefore, a balance must be established between cultivated plants and weeds grown in the same environment, so that weeds are allowed to serve the bio-ecosystem (Kraehmer, 2012; Terfa, 2018). Weeds have been reported to be more harmful in crops than insects, fungi, bacteria, and viruses (Gharde et al., 2018). Weeds cause a significant loss of agricultural production, especially the weeds with rhizome, stolons, and tuber roots; *Elymus repens*, *Sorghum halepense*, *Cyperus rotundus*, and from parasitic plants *Orobanche* spp. and *Cuscuta* spp, these weeds are very difficult to control, so more than one method of control should be applied for these species. Such weeds increase the cost of production, if weed control is neglected, the yield loss can be reach 100%. For example, the high-intensity competition of *S. halepense* caused 88-100% yield loss in the corn crop, 59-88% in soybean, 70% in cotton, and a 69% yield loss in sugar cane (Uludag et al., 2007; Barroso et al., 2016). *Cuscuta campestris* has been reported to cause 75% yield loss in tomato yield (Lanini, 2004). Yield loss can reach 100% if *C. campestris* is not controlled in tomato fields (Üstüner, 2018). In India, the total economic loss is estimated at 11 billion USD in 10 large crops due to weeds alone (Gharde et al., 2018). The increasing use of these herbicides day by day carries significant risks for human and environmental health. Nowadays, herbicides take the first place in plant protection drugs produced in the world by 47% on the basis of the active substance. However, in Turkey, the use of herbicides constitutes 24.43% of the pesticides used in the agricultural fields and ranks third among the pesticides used in the protection of crops. In addition,

between 2007 and 2008, herbicides ranked first in pesticide categories. Europe is the largest consumer of pesticides in the world. In developed countries, pesticides, mostly of herbicides, are mainly used in corn cultivation (Sitaramaraju et al., 2014). Turkey in 2018, the used pesticides were 59.000 tons, 13.000 tons of them were herbicides, which is equal to 22%. A significant increase in herbicide consumption has been observed and reached 30% in the 12 last years. This pesticide used sales amount is approximately 2.5 billion Turkish pounds (Anonymous, 2018). Natural environments are polluted by herbicides, and its destructive effects have started to emerge in soil, water, and environment. In this research, alternative control methods that can limit or reduce the use of herbicides will be mentioned by showing the effects of herbicides on different environments and human health.

II. THE REASONS FOR THE INCREASE IN HERBICIDE USE AND THE WAYS OF SPREADING IN DIFFERENT ENVIRONMENTS

Herbicide use in the world is increasing rapidly due to the high cost of labor and decreasing labor force. Approximately 33% of agricultural products are produced accompanied by using pesticides. Herbicides make up more than 80% of the total pesticide consumption used to protect crops (Ferrero and Tinarelli, 2007; Sitaramaraju et al., 2014). There is a misconception that herbicides are safe for human health and had little impact on the environment. For this reason, the high use of herbicides in agricultural production pollutes the soil, water, environment, and air. As a result, tons of herbicides are applied in agricultural areas every day. Herbicides in Turkey are an indispensable part of crop production (Anonymous, 2018a). The use of herbicides has increased in many cultivated crops around the world (Mahmood et al., 2015). The vast majority of herbicides do not only target weeds but also affect non-target plants and animals during its application (Sitaramaraju et al., 2014). The widespread use of herbicides for many years, with the wrong use methods, high doses, and the spread of herbicides with abiotic factors caused global contamination in various environments and negatively affected all living organisms entering the food chain. We recommend formula 5 D in order to get more effective results in the control against weeds, but also not to harm human health, environment, fish and bees. The 5 D formula proposed in the control against fungal pathogens was adapted from Mutlu and Üstüner (2017) and it was proposed in the control against weeds; 1. Correctly identifying weed species, 2. Using herbicides at the right time, 3. Choosing the right herbicide, 4. Apply in the right dosage and 5. Applying the right spraying method. As in the case of glyphosate, it has been one of the most widely used herbicides in human history and its remains were detected in the diapers and the medical gauze. In addition, it has been discovered that the remains of some new generations of herbicides such as dactal, metolachlor, and trifluralin are found in water, snow, fog, and air samples were taken from the North Pole (Garbarino et al., 2002). There are two ways pesticides enter ecosystems, depending on their solubility. Some pesticides dissolved in water and enter the

water environment, and other pesticides are fat-soluble pesticides that are stored in living organisms by a process known as biological cations that cause them to remain in the food chain for a long time (Warsi, 2015). Herbicide particles can not only stay where they are applied but can also spread in other non-target areas through factors such as soil, wind, and water. Thus, it damages microorganisms by making toxic effects on different environments. The adsorption of herbicides to soil ions is affected by the moisture content of the organic matter and the physical and chemical composition of the soil. The plant transmits the herbicide molecules it absorbs to all its organs through conduction bundles. Herbicide can be passed on to the animals fed on the plant and is included in the food chain. Herbicides applied to the soil or plant surface are mixed with the atmosphere by evaporation and can be transported by the wind for long distances. The herbicides move through horizontal and vertical infiltration in the soil. In this case, it is affected by the content of water in the soil, soil structure, clay content in the soil, and organic substances. Herbicides are washed with rain and can mix into groundwater (Jurado et al., 2011). The risk of herbicides is not only limited through infiltration into other environments but also because of its slow decomposition then it can maintain its biological activity in the soil for many years. Residue amount of some herbicides in the soil; It was calculated to be 0.021mg for atrazine, 0.075 for chlortoluron, 0.475 for methabenzthiazuroun, 0.044 for monolinuron, 0.118 mg for terbutryn. A half-life is a time it takes for a certain amount of a pesticide to be reduced by half. In addition, compounds resulting from pesticide degradation may have greater toxicity than the pesticide itself (Kortekamp, 2011). For example, two years after glyphosate and AMPA spraying, it found in water samples at a concentration of 0.1 mg/L (Sitaramaraju et al., 2014).

III. THE EFFECT OF HERBICIDES ON HUMAN HEALTH

Every year, many herbicides were banned in some countries due to its harmful effects on human health, but this is done after tons of herbicides were applied and spread to the environment. Many herbicides had caused serious human diseases so it had banned. This does not mean that the herbicides allowed to use are innocent because its direct and indirect effects are difficult to identify complex and costly. The effect of some banned herbicides such as paraquat may lead to diseases and cause deaths (Kortekamp, 2011). The future risks posed by the dangerous properties of the herbicides currently in use cannot be evaluated in terms of human health. In the world in 1999, the number of deaths caused by pesticide poisoning reached about one million persons. World Health Organization reported that poisoning cases caused by pesticides are generally 3 million persons per year (OECD, 2008, WHO, 2016). Herbicides have two types of toxicity, acute and chronic toxicity. Many herbicides have moderate to weak acute toxicity. It is estimated that the chronic effects of herbicides can be very important and threaten human life like in (2,4-D) (Weisenburger, 1993). While testing the herbicidal in terms of the possibility of cancer-causing in Syria, they achieved a positive result in the

hamster embryo assay (Maire et al., 2007). In addition, it has been reported that using pesticides is associated with prostate cancer in farmers, causing endocrine disruption, decreased sperm count, or increased abnormalities in sperm. In the case of dioxin pollution and exposure to 2,4-D in admixture with other pesticides, a wide range of results was found in cancer risk research (Garabrant and Philbert, 2002; Soloneski and Larramendy, 2011). It also caused chromosomal aberrations in plants, mice, and human cells, including human lymphocytes for occupationally exposed workers to pesticides (Garaj-Vrhovac and Zeljezic, 2001; Ateeq et al., 2002). The 2,4-dichlorophenoxyacetic acid (2,4-D) and 3,6-dichloro-2-methoxy benzoic acid (Dicamba) from the herbicides belong to the Auxinic group, the world's most common post-emergence herbicides are that used to control broadleaf weeds in grain crops (Reinbothe et al., 1996). Based on its toxicity, both of these herbicides are classified as class II members (moderately dangerous) by WHO (2016). It has been determined that each of the herbicides 2,4-D and Dicamba can cause DNA damage in CHO cells and human lymphocytes when the chromosomal and DNA levels were analyzed. Dicamba and 2,4-D have been reported to cause SCEs in mammalian cells and it has clastogenic activity. (Soloneski and Larramendy, 2011). Dicamba (2-Methoxy-3,6-dichlorobenzoic acid) has been listed by the US EPA as an increased toxin, has a negative reproductive effect and Cholinesterase inhibitor (Anonymous, 2002). Glyphosate is the chemical substance that is the best-selling herbicide in human history and the world and constitutes 60% of the broad-spectrum herbicide sales (Dill et al, 2010; Atwood and Paisley-Jones, 2017). Glyphosate can cause chronic health effects in laboratory animals. Nutritional experiments with glyphosate lifetime have shown weight reduction, effects on liver and kidney, and damage to the eye lens. These effects were only at the higher doses tested. Tests with rabbits have shown dose-dependent negative effects on sperm quality (Cox, 1991; WHO, 1994; Annett et al., 2014; Mesnage et al., 2015). Clinical studies have shown that workers who previously used glyphosate had a higher incidence of non-Hodgkin lymphoma, a rare form of cancer compared to those who did not use glyphosate (Eriksson et al., 2008). Also, most toxic tests have been done only on glyphosate and a limited number of tests have been made on formulated products (Cox, 1991). A glyphosate activity that damages DNA in the liver and kidneys of mice has also been observed (Soloneski and Larramendy, 2011). Polyoxymethylene Amine, an additional ingredient added to most formulations, has been found to be more acutely toxic than glyphosate itself (Claudia et al., 2014).

IV. THE EFFECT OF HERBICIDES ON THE ENVIRONMENT

Herbicides are spread in different environments by various methods mentioned earlier. Thus, herbicides affect the organisms of these environments, causing a toxic effect and can then directly affect people. It is found that 40% of the world economy is directly linked to ecosystem services due to indirect effects (SCBD, 2010). 60% of ecosystem services have deteriorated in the past 50 years (Anonymous, 2005).

IV.1. The effect of herbicides on non-target plants

Herbicides, especially broad-spectrum herbicides, affect plant biological diversity and damage environmental balance. In addition to the possibility of killing crops, herbicides can reduce plant yield and increase susceptibility to diseases. For example, glyphosate significantly increases the severity of various plant diseases, and lead to weakening plant capacity to resist against pathogens, and immobilizes soil and plant nutrients (Johal and Huber, 2009). Due to these effects and increased weed tolerance and resistance, farmers have to use fungicides and supplemental herbicides in cereals, causing excessive ecological effects. It can also lead to the complete extinction of weeds that have an impact on agricultural ecosystems. Therefore, agricultural biodiversity and ecosystem functions such as biological control, pollination, and functional soil structures are increasingly compromised, as well as the almost complete elimination of weeds. This ecological degradation also posed a particular threat to endangered plant species (Schütte, 2003). The US Fish and Wildlife Service identified 74 endangered species that could only be threatened by glyphosate (Anonymous, 1986). Seed quality of cultivated plants exposed to glyphosate has been significantly reduced (Locke et al., 1995).

IV.2. The effect of herbicides on animals

Herbicides affect animals directly or indirectly. As a result of the use of pesticides; herbicides, and fungicides there are decrease in the numbers of rare animals and some species of endangered birds (Anonymous, 2010). Herbicides can affect arthropod community dynamics separately from their effects on the plant community and also affect the biological control factors in agroecosystems (Evans et al., 2010). Glyphosate caused high death levels of frogs in its effect study. Herbicide application is reported to lead to a decrease in chicken and bird population (Taylor et al, 2006). In addition, it has been reported to occur degradation of frog genetics due to atrazine (Hayes, 1990). Exposure of chicken eggs to 2,4-D reduced incubation time and has been reported to cause feminization and infertility in pheasant chicks (Duffard et al., 1981).

IV.3. The effect of herbicides on soil

Herbicides are retained by soils of different degrees, depending on the interaction between the properties of the soil and herbicides. The most effective soil feature is organic matter content. As the organic matter content increases, the adsorption of herbicides also increases. Whenever the soil colloids were even smaller, its adsorption increases herbicide. Accordingly, the amount of herbicide molecules adsorbed is high (Andreu and Pico, 2004). Active persistence period of some herbicides applied to soil; Acetachlor 3-12 months, Alachlor 1.5-3 months, Atrazine 4-18 months, Bromacil 9-18 months, Cholorxuron 3-6 months, Chlordbiamid 12-24 months, Dichlobenil 12-24 months, Isoxaben 6-12 months, Metsulfuron 2 -12 months, Oxadiazon and Terbacil 9-18 months, Trifluralin 5-10 months (Börner et al., 1979, Monaco et al., 2002). Factors such as soil organisms, soil structure, transformation, and organization of organic substances that provide the nutrition of plants are negatively affected by herbicides. Many herbicides can destroy microorganisms in the soil. On the other hand, microbial disruption can lead to the formation of more toxic and permanent metabolites. Although microbial soil complexes can

adapt to changing environmental conditions, the application of herbicides has been reported to cause significant changes in populations (Sitaramaraju et al., 2014). Herbicides prevent the plant from taking advantage of this, as atmospheric nitrogen disrupts the conversion function to nitrate because it had a negative effect on the microorganisms that performed this process. Triclopyr inhibits soil bacteria that convert ammonia to nitrite, and 2,4-D has been found to reduce nitrogen fixation of bacteria that live in the roots of bean plants (Fabra et al., 1997). Glyphosate reduces the *Arbuscular mikorhizal* fungi communities, which negatively affects the microbes present in the soil that benefit from this fungus with nutrition. Glyphosate has been reported to be toxic to beneficial soil bacteria such as Bacillus family, by inhibiting soil minerals (manganese, iron, etc.) and free-living nitrogen stabilizing bacteria which make plants biologically usable (Johal and Huber, 2009; Zaller et al., 2017). Earthworms play an important role in the soil ecosystem. It operates in the soil as a bioindicator and may show deterioration in soil quality in the early period. A study in Argentina reported that glyphosate has harmful effects on Earthworm's population (Casabé et al., 2007).

IV.4. The effect of herbicides on the aquatic environment

Herbicides can infiltrate the aquatic environment in many ways and cause harmful effects on living organisms. It has been determined that herbicides used in agricultural areas affect aquatic life and this kind of pollution is observed both in the laboratory and in the fields (Daam et al., 2009). Approximately 1% of the applied herbicide is estimated to leak into the surrounding environment and rain precipitation can increase this rate up to 3% (Bengtson et al., 2005). In the Netherlands, herbicides have been found to be used at concentrations above legal standards. Herbicide pollution has been reported in water and sediment samples taken in Australia (Magnusson et al., 2008; Knauer et al., 2010). In addition, studies have reported that herbicides such as atrazine, simazine, alachlor, metolachlor and trifluralin are found in surface water and groundwater close to agricultural areas (Añasco et al., 2010). Aquatic plants provide about 80% of dissolved oxygen and are essential for survival of organisms in the water. Herbicides have been observed to kill aquatic plants, thereby lowering O₂ levels and ultimately reducing fish numbers in the water (Helfrich et al., 2009). Atrazine and alachlor have a serious effect on algae and diatoms, which are the main organisms in the food chain in the aquatic environment. It has been reported to cause degradation of compounds in cells, preventing photosynthesis and inhibiting plant growth, even at low levels from herbicides using (Anonymous, 2000). Due to the application of herbicides close to the fish environment, the reproductive potential of many aquatic organisms, including fish, has decreased (Helfrich et al., 2009). Trifluralin has been shown to be highly toxic to fish, causing to form spinal deformities in fish. It has also been found to be highly toxic to marine organisms such as shrimps and mussels (Anonymous, 1996). 2,4-D herbicides in *Sockeye salmon* have been reported to cause physiological stress responses and reduce rainbow trout's ability to collect food, and are harmful to shellfish and other species (Cheney et al., 1997). Herbicides containing Glyphosate or glyphosate have been reported to cause adversities such as fish irregular swimming and lack of oxygen (Liong et al., 1988).

V. THE PLANTS AND WEEDS THAT HAVE RESISTANT TO THE HERBICIDE

The introduction of herbicide-resistant cultivated plants may cause more herbicides to enter the agricultural system. In addition, the use of genetically modified organisms (GMO) products, their potential effect on the environment and human health, the release of these products will lead to an increase in the use of herbicides, thereby increasing their environmental hazards. Weeds can become more resistant to these herbicides, which will cause farmers to increase the herbicide dose and increase environmental pollution. Due to the lack of results regarding the use of herbicide-tolerant crops, a five-year ban has been proposed on the release of herbicides in many countries. This prohibition will provide the time needed to assess the risk status of herbicide-tolerant crops (Buffin and Jewell, 2001; Bennett et al, 2004). If Glyphosate is widely applied in GMO agriculture, almost no alien species may remain (Buffin and Jewell, 2001). Since GMO plants are produced in herbicide companies, it will increase the use of herbicides produced by these companies, thereby speeding up the resistance of these plants for herbicide. In recent years, in Turkey, many weed species are known to be resistant to many Active substances; such as *Avena sterillis*, *Sinapis arvensis*, *Cyperus difformis*, *Phalaris brachystachys* and *Echinochloa crus-galli* (Aksoy et al., 2007; Anonymous, 2017). In one study, approximately 500 weed species were determined to be herbicide-resistant species, more than 100 weed species were resistant for two types of herbicides, more than 50 weed species had resistant for three types of herbicides, and more than one weed species were had resistant for 11 types of herbicides. As a result of excessive glyphosate use, the number of resistant weeds was determined as 424 species (Heap, 2019).

VI. INDIRECT EFFECTS OF HERBICIDES

Herbicides can indirectly affect the population of birds, mammals, insects, and other animals with changes in the nature of their habitats, as they cause large changes in vegetation. Some herbicide compounds have been found to have toxic metabolites that can remain in nature for a long time (Knauer et al., 2010; Hossain, 2015). Economic damage to herbicides in non-target species (including plants, humans) is estimated to be 8 billion dollars annually. In fact, the relatively common use of herbicides can be particularly problematic. The best way to reduce herbicide contamination in our environment is to use harmless ones such as biological, biotechnical, physical, mulch methods that are safer for weed control (Aktar et al., 2009).

VII. SOME ALTERNATIVE METHODS FOR WEEDS CONTROL

There are many non-chemical processes and methods used to reduce weed damage. Some of these methods are widely used, while others are less commonly used. Natural chemicals such as plant essential oils have a very important effect on weed control. Eucalyptus essential oils containing chemical compounds (oxygenated sesquiterpenes, monoterpene hydrocarbons, sesquiterpene hydrocarbons, and oxygenated monoterpenes) were found to be 80% effective in the control

against weeds, especially *Amaranthus retroflexus*, *Rumex crispus*, and *Convolvulus arvensis* (Üstüner et al., 2018). Some methods may be successful against certain weeds. Therefore, integrated weed management; many methods are known as mulch, solarization, tillage in hot months, hand and machine hoe (IWM) suggest using more than one method in the integrated program. These methods can be counted as cultural, mechanical, thermal and biological.

VII.1. Cultural weed control

Includes, crop rotation, increasing crop competitiveness, planting time, irrigation type, cover crops, and intermediate hoeing (Shrestha, 2006).

VII.1.1. Competitive variety selection

Cultivating a competitive crop is an effective method of reducing weed growth due to the crop's intervention. Crop competition is an important and cost-effective tactic to increase weed suppression and optimize crop yields (Blackshaw et al., 2008). Some agricultural factors such as cultivar plant diversity, seed rate, row spacing, seed placement, and fertilizer management can be applied to support crop competitiveness (Lemerle et al., 2001).

VII.1.2. Cultivating time

Early sowing provides a competitive advantage for cultivated plants. This advantage is slow germination and growth of weeds that cannot benefit from sunlight due to the germination and shading of the crop before weeds (Cici et al., 2008). When wheat was cultivated early, there was a 68-80% reduction in the population of canary herb (*Phalaris minor*) (Kumar et al., 2013). When cultivating barley seeds 4-6 weeks before normal cultivating dates, it caused to reduce weed seed production and biomass (Lenssen, 2008). Changes in cultivating times significantly affect the weed population (Norsworthy et al., 2012).

VII.1.3. Fertilization

Careful timing of fertilization is important to ensure the development of the crop plants at an optimum level and limit the use of nutritional elements by weed species (Norsworthy et al., 2012). It has been determined that with the application of N-fertilizer in the root extension phase of winter wheat, *Veronica hederifolia* reduces the biomass and supports the production of biomass for crop according to the N-fertilizer application during the wheat cultivating period (Liebman and Davis, 2000).

VII.1.4. Crop rotation

Crop rotation is considered an important technique for controlling weeds (Cardina et al., 2002). Rotation of plants with different life cycles prevents weed density and therefore seed production. Allelopathic effects of cultivated plants on weeds are extremely important in crop rotation (Derksen et al., 2002). Populations of broad-leaved and narrow-leaved weeds density such as *Chenopodium album*, *Amaranthus retroflexus*, and *Setaria faberi* were reduced in the corn-oat rotation system by 88%, 29%, and 80%, respectively (Cardina et al., 2002).

VII.1.5. Plant covers

Live cover plants that can be applied in orchards compete with other weeds in terms of nutrients in the soil, suppressing more than one weed species. It also minimizes above-ground residues, soil erosion, and nutrient losses. Covering plants prevent biotic and allelopathic effects and other weeds that can

germinate (Teasdale et al., 2007). Cover crops contain a wide range of plants grown for various ecological reasons outside the soil (Sarrantonio and Gallvet, 2003). Rye cover crops are capable of holding more nutrients than fertilizer applications and preventing the emergence and growth of many weeds. Rye cover prevented the growth of 45% of *Ambrosia artemisiifolia*, 85% of *Setaria viridis*, 100% of *Amaranthus retroflexus*, *Chenopodium album* and *Portulaca oleracea*, but had no effect on *Setaria glauca* (Shilling et al., 1986).

VII.1.6. Crop residue

Crop residue retaining is used as an effective method to reduce the density of weeds. Some weed populations are highly susceptible to mulch, while other weed species may emerge and outflow from soil moisture in a small amount of mulch. It may be enough to leave large amounts of residue in the field to minimize weed density (Chauhan et al., 2012). When the percentage of crop residue (*Secale grain* or *Vicia villosa*) is increased, a significant reduction in weed density has been observed (Teasdale et al., 2007).

VII.2. Mechanical control

VII.2.1. Hand tools

Hand hoe is an effective method to prevent the spread of annual weeds. However, it is less effective against perennial weeds due to vegetative reproductive organs (rhizome, stolon and tuber). It is widely used to control weeds that are problematic in horticultural crops (Zimdhal, 2007).

VII.2.2. Soil cultivation

Tilling the soil is known to be effective in lowering weed populations. It is important to plow the soil. Especially when the tillage is done 45 days before cultivating, many weed species are released until cultivating time, and the weed reserve in the soil is significantly reduced since the soil is cultivated again during cultivating (Shrestha, 2006). Tillage can temporarily drag some weed seeds to deeper layers, while encouraging others to germinate, reducing weed seeds reserves in the soil (SantínMontanyá et al., 2016).

VII.2.3. Thermal method

Thermal methods, effective in weed control; covers flame, hot water, steam and solarization methods. These methods do not have any side effects in agriculture and water (Ascard et al, 2007).

VII.2.3.1. Flaming method

The heat produced by the propane flame can reach temperatures up to 990°C and dry the plant leaves and damage the plant cells (Diver, 2002). For this method to be lethal, leaf tissue must be exposed to temperatures between 55-70 °C for a period of 65 to 130 microseconds (Knezevic, 2017). In general, some narrow leaf weeds are more resistant to flame than broadleaf weeds because of their stolon and rhizome root structure (Ulloa et al., 2010). When using 60-80 kg/ha propane in this method, some narrow leaf weeds such as *Setaria viridis*, *Pennisetum glaucum*, and *Echinochloa crus-galli* can be controlled over 80%, while broadleaf weeds such as *Amaranthus retroflexus*, *Abutilon theophrasti*, *Ipomoea hederifera*, and *Chenopodium album* can be controlled 90% (Ulloa et al., 2010; Knezevic, 2017). If it is applied in areas with a high amount of crop residues, it should be done carefully, as this can cause a fire. The flame method is a technique used to control weeds in corn and soybean fields. The success of weed control with this method can vary

depending on both timing and temperature (Ascard et al., 2007). In a Danish study, the Flame method has been found to keep the weed density at the lowest level in the feed beet *Beta vulgaris* fields (Rasmussen, 2003). The flaming method is not suitable for all crop types, so farmers should first be informed about which crops are sufficiently heat resistant and at which stage weed burning is appropriate (Naylor and Lutman, 2002).

VII.2.3.2. Hot water method

Hot water application may be an alternative method for weed control in small areas, but it may not be practical in large-scale control operations since the equipment requires a large amount of water and energy. Another disadvantage of hot water application can be harmful to beneficial soil microorganisms and insects. It can control some pathogens and nematodes as well as weeds in small areas (Ascard et al., 2007). Whilst white mustard (*Sinapis alba*) is in the two-leaf stage, using a hot water spray at 110 °C, 90% control can be achieved with 1.3 km / h speed of equipment and 0.5 km / h movement speed in the six-leaf stage (Hansson and Mattsson, 2003).

VII.2.3.3. Steaming method

A steam generator can kill weeds in the soil, usually at 60-80 °C and in 20-30 minutes (Melander et al., 2013). A study conducted in strawberry fields revealed that steaming the soil at 70 °C for 20 minutes provides good weed control (Samtani et al., 2011). Weed steaming significantly reduced the germination of *Alopecurus myosuroides* and *Fallopia convolvulus*, but was not very effective on *Matricaria chamomilla*. The success of this method may vary depending on weed species, vapor temperature, exposure time, and plant size. In perennial weed species, the exposure to steam should be repeated as they can reproduce (Ascard et al., 2007).

VII.2.3.4. Solarization method

Soil solarization method is based on the principle of raising the soil temperature by laying the transparent white-colored polyethylene on the soil surface, fully absorbing sunlight in the hot summer months. High soil temperature can kill bacteria, fungi, weeds and weed seeds (Stapleton and Devay, 1986). Soil solarization has been successfully used to control weed species with minimal cover in semi-arid regions (Johnson et al., 2007). In a study of the effects of soil solarization on *Orobanche ramosa* and *Orobanche cernua* in tomato fields, it has been found that both black and transparent plastic mulches reduce the Orobanche seed bank by 89% and 98%, respectively. *Cyperus esculentus* was controlled when it was solarized for at least 90 days in the summer of the previous year (Johnson et al., 2007).

VII.3. Biological control

The biological control for weeds using natural enemies started at the beginning of the 20th century and developed rapidly. The first study on this subject was the use of natural enemies against the *Lantana camara*, a cactus species in the Hawaii Islands, and *Opuntia* species in Australia. Biological weed control is a system that involves the use of various biological organisms and biological-based approaches to significantly reduce weed density (Sodaeizadeh and Hosseini, 2012). Many living organisms, such as fish, birds, herbivores, insects, fungi, bacteria, viruses, parasitic plants, which can reduce the population of weeds, can be used as biological factors. In Hawaii, cactus (*Lantana camara*) spread with birds in that area

and was found intensely everywhere 40 years after birds entered. Larvae from insect species (*Crocidosema lanata*) were used and *L. camara* was taken under control in a short time (Güncan, 2013). Geese feeding on weeds that have just emerged from strawberry fields are considered important birds, Geese are especially effective in the morning and evening (Singh et al., 2018). Pathogens such as *Alternaria macrospora* were used in the granular formulation to control seedlings of *Anoda crista* herb before it appeared. *Septoria cirsii* fungus species against *Cirsium arvense*, *Bactra verutana* insect species against *Cyperus rotundus*, *Sclerotinia* spp. fungus species against *Orobanche cernua*, *Microlarinus larevnii*, *M. lypriformis* insect species against *Echinochloa* spp. species *Emmolocera* spp. insect species found effective (Sharma, 2006). Essential oils extracted from eucalyptus have been found to be effective on *Melilotus officinalis* and *Amaranthus retroflexus* and have a low effect on *C. arvensis* (Üstüner et al., 2018). In another bioherbicide study, *Cuminum cyminum*, *Mentha longifolia* and *Allium sativum* in the effect study of essential oils on *Rumex crispus* and *C. arvensis*, *A. sativum*'s effect was 100%, seed germination of *R. crispus*, It has been reported that it inhibits root and shoot growth, *C. cyminum* and *M. longifolia* sourdough is 100%, while the three essential oils have a significant effect (100%) on the parameters examined against *C. arvensis* (Üstüner et al., 2018a). Some plants are very competitive in nature and can prevent some weeds. These plants can secrete some inhibitory compounds during an event called allelopathy. Thus, these plants act as bio-herbicides. Biological control of weeds in modern agriculture is provided by various bioherbicides used in many countries of the world (Singh et al., 2018). Isothiocyanates, which are secondary metabolites, occur under the enzyme effect in cabbage plants. The use of isothiocyanates was effective in the fight against some important weeds in tomato production (Bangarwa et al., 2012).

VII.4. Integrated control

One method for controlling of weeds may ineffective., it is preferred to apply more than one method together for effective control. Integrated pest management is promoted by FAO as a preferred strategy for pest control worldwide (Singh et al., 2018). Integrated weed management has three main objectives. Weed density should be reduced to tolerable levels, the amount of damage caused by a particular weed density to an associated crop should be reduced, and the composition of weed communities should be made less harmful (Liebman, 2001).

VIII. RESULTS AND DISCUSSION

The ease of use of herbicides in agricultural production provides important advantages such as the rapid acquisition of results and the control of some weed species that are difficult to control by other methods. Despite these advantages of herbicides, widespread and improper use is known to cause serious consequences for the structure, environmental pollution, and the entire biological system, often threatening human health. Unless the rapid increase in herbicide consumption is reduced, serious losses are expected to occur in the short and long term. For these reasons, it has become important to investigate alternative and friendly, more reliable

methods with the environment and humans of combating weeds. Of course, the use of herbicides may not disappear completely, but keeping the chemical method first in the fight against weeds in agricultural production can lead to enormous environmental damage. It is possible to expand solarization and plastic polyethylene methods. Some of the biological control methods can last for a long time and hence the effect is delayed and considering that the applicability as a region is not very common, farmers do not seek such alternative methods of struggle. The fact that herbicide use gives results in a short time attracts farmers. It is likely to become widespread due to the fact that essential oils obtained by making use of the allelopathic properties of plants are an effective and short-term method with the practical use in the agricultural sector. It is very important to increase and support scientific researches for bioherbicide production. Herbicide use can be reduced by using more than one alternative method in the integrated weed management program. Therefore, farmers should be convinced and their awareness about the negative effects of herbicides should be increased. For these reasons, separate studies should be conducted on integrated weed management for weeds related to each crop. In addition, integrated weed management must be formulated and presented so that it can be used by farmers.

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Team Identification as an Outcome of Team Satisfaction;

A Case of Shop-floor Level Workers in the Tableware Manufacturing Organizations in Sri Lanka

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Abstract: The study examined whether team satisfaction enhances team identification, constructing a model which is including determinates of team satisfaction: mutual support, a common goal, and multi-skills. The structural relationships between all variables were evaluated using quantitative data which was obtained from 328 shop-floor level workers in the table-ware manufacturing organizations in Sri Lanka. The study confirmed that team identification is directly improved by team satisfaction and as well, supportive activities (mutual support) and employees' awareness on the team's goal (common goal) make effects on team identification, indirectly. Even though the, multi-skills factor does not make a considerable effect on team identification, it acts as an important factor that can enhance the supportive activities in the teams. Accordingly, the present study provided evidence to prove, theoretically, that there is the possibility of enhancement of team identification through team satisfaction, contrasting the previous findings and practically, organizations can improve team identification via creating a team-based work environment which increases the employees' satisfaction.

Keywords: Team identification, Team satisfaction, Characteristics of a team, Manufacturing workers and Sri Lanka

I Introduction

Identification in organization has emerged as a topic of keen interest in organizational research. Identification at the work organizations is recognized in multi-level such as individual level, team level and organizational level (Miscenko & Day, 2016; Ashforth et al., 2008). However, some previous research (Postmes et al., 2019; De Moura et al., 2009) has nested these three levels into one concept as social identification, based on the Social Identity Theory (Ashforth & Mael, 1989). Individual level identification was an important concept in the traditional work organizations and in the organizational level identification considers organization as a whole (Miscenko & Day, 2016). According to Ashforth and Mael (1989) team identification (TID) points out the employees' perception of belongingness to a team in the micro level (Ashforth et al., 2008) and, simply, this can be named as cognitive team identification (Yan et al., 2017; Dimmock et al., 2005; Jackson, 2002). Van Dick et al. (2008) have reported that TID is more favourable for teams since it enhances the performance of team (Dietz et al., 2015; Hu and Liden, 2013; Bezrukova et al., 2009). As well, TID mitigates the depression situation of employees (Postmes et al., 2019), and decreases the turnover of employees (Li et al., 2015; Riketta & Van Dick, 2005).

Therefore, during the past few decades, TID has been increasingly used to explain employees' belongingness to work teams. However, as Ashforth et al. (2008) reported that most of the studies on TID have focused on outcomes of TID, particularly, satisfaction is concerned as an outcome of TID, rather than the process of it. In other words, there is little consideration about how TID occurs in the team. Even though TID is not always a predictor for team satisfaction (Robert, 2013), a number of previous studies have reported that TID is a cause of employees' satisfaction in the team (Michinov & Juhel, 2018; Hu & Liden, 2013; Van Dick et al., 2008; Riketta & Van Dick, 2005). However, the opposite is also possible, that is, team satisfaction may become a cause of TID since satisfied workers in a team would be willing to be introduced as "I am a member of the team" that he or she likes, or say, would express the belongingness to the team more than the unsatisfied members. In the literature, Su et al. (2016), considering individual level, and De Moura et al. (2009), considering organizational level, have reported that satisfaction improves the identification, but not the team level. Nonetheless, discussion regarding this relationship is atypical in the academic world. And furthermore, even though De Moura et al. (2009) have reported that relationship between satisfaction and TID, there is not discussion about how satisfaction occurs.

Accordingly, the present study examines evidence from two manufacturing organizations to confirm whether there is a relationship between team satisfaction and TID, considering team satisfaction as a cause factor (team satisfaction → TID) as well as the outcome of encouraging factors of team satisfaction in the team. That is, the study evaluates whether the team members are satisfied or not with their team members, the work of the team, and the friendliness of team members enhancing TID with the underlying mechanism of team satisfaction.

II Literature Review and Hypotheses Development

As mentioned earlier in the introduction, a number of investigations (Michinov & Juhel, 2018; Hu & Liden, 2013; Van Dick et al., 2008; Riketta & Van Dick, 2005) have reported that the TID enhances team members' satisfaction. Despite these findings, however, an argument exists over its converse effect, that is, workers' satisfaction would enhance the TID (De Moura et al., 2009), too. Team satisfaction means the members' satisfaction in the team (Barczak & Wilemon, 2001) and concerns the satisfaction as a whole (Riketta & Van Dick, 2005) and this includes satisfaction regarding work (Strubler & York, 2007), colleagues and their way of work in the team (Van Der Vegt et al., 2000) and the friendliness of team members (Mwaisaka et al., 2019), and these favourable factors would enhance the employee awareness on belongingness to the team. Team satisfaction, however, could occur with the effect of various factors, particularly, team characteristics have been identified as the determinates of team satisfaction (Mayfield et al., 2016; Gittel, 2011; Barczak & Wilemon, 2001; Van de Vegt et al., 2001; Van Der Vegt et al., 2000; Cohen & Bailey, 1997). For instance, Barczak and Wilemon (2001) have pointed out that the employees' perception on their common goal, supportive activities and multi-skills capability improve the team members' satisfaction, by using the non-numerical way. In the literature of teamwork, multi-skills, common goal (consider about employees' awareness on team's goal) and mutual support have been recognized as the defining characteristics of work teams, particularly which are in the manufacturing work organizations (Kozlowski & Bel, 2013; Morita, 2008; Katzenbach & Smith, 1995).

Based on the literature of team and relationship between the defining factors of team, it can be assumed that there is a mechanism which enhances the team satisfaction since common goal and multi-skills factors create an effect on the team satisfaction through the peer supports (mutual support). This is because, when team members have a good understanding about the team's goal, it intensifies the team members' collectiveness and friendliness (Weingart & Weldon, 1991) and improves the willingness to help others (Gonzalez-Mulé et al., 2014), more than individual goal setting and in turn, team members work together with cooperative work practices to accomplish their work goal (Hu & Liden, 2015; 2011; Chen et al., 2009). As well, understanding about each other's job is a very important task in the team since it helps to achieve their final target collectively. Particularly, in the team, each member's skills, knowledge level and work experience can be different. At this kind of situation, members who have less work experience or skills would seek help from their colleagues who have comparatively high work skills, knowledge and experience. Bamberger (2009) has identified this kind of situation as the help-seeking behaviour. Then, multi-skilled workers can deal with this help need. In summary, it can be said that multi-skills cultivate the mutual support in the team (George and Jones, 1997) although there is lack of research which has confirmed the relationship between multi-skills and mutual support, statistically.

Accordingly, a common goal and multi-skills factors help to create the supportive work practices in the team. And then, having cooperative work practices creates a smooth and favourable environment at the workplace (Salas et al., 2015). Clancy and Tornberg (2007) say, when any organization has established a mutually supportive work environment in a work team, it encourages the team member to identify another's assistance need promptly. Further, in the team, some members (e.g. newly recruited employee) can feel a high workload and stress. Those burdens can be eased thorough supportive behaviour (Hu & Liden, 2015; Kalleberg et al., 2009). To sum up, support from other members creates the positive effect on the team satisfaction (Schreurs et al., 2015; Champion et al., 1996) with other characteristics of the team. Hence, multi-skills and awareness of common goal can be considered as the antecedents of mutual support. And regarding team satisfaction, mutual support works as the intervening variable.

Furthermore, Lunenburg (2011), Stark and Bierly III (2009), Van de Vliert et al. (2001) and Champion, et al. (1996) reported that the existence of team members' awareness of a common goal improves team satisfaction, directly, because having awareness of a common goal shares responsibilities equally among team members (Stark and Bierly III (2009; Champion et al. 1996). Not only does a common goal enhances team satisfaction, but Van der Vegt et al. (2003) and Ashforth & Mael, (1989) suggest that a common goal also enhances TID. Moreover, even though they are not native characteristics of team, team members' participation in learning and team members' intention to learn new things are important predictors of obtaining multi-skills since Kyndt et al. (2014) and Kyndt and Baert (2013) have argued that intention to learn new things extends the skills through fostering employees actual participation in the learning.

Accordingly, based on the above theoretical discussions, it can be assumed that team satisfaction fosters TID. Further, a common goal also makes the direct effect to TID. And, regarding team satisfaction, it can be assumed that the mutual support factor enhances team satisfaction with common goal and multi-skills factors. As well, learning intention and participation in learning can be considered as influential factors for workers multi-skills development. Therefore, the following hypotheses and conceptualized model can be developed, considering the literature.

Hypotheses on TID

H1: Team satisfaction has a positive effect on team identification

H2: Common goal has a positive effect on team identification

Hypotheses on mechanism of team satisfaction

H3: Common goal has a positive effect on team satisfaction

H4: Common goal has a positive effect on mutual support

H5: Multi-skills has a positive effect on mutual support

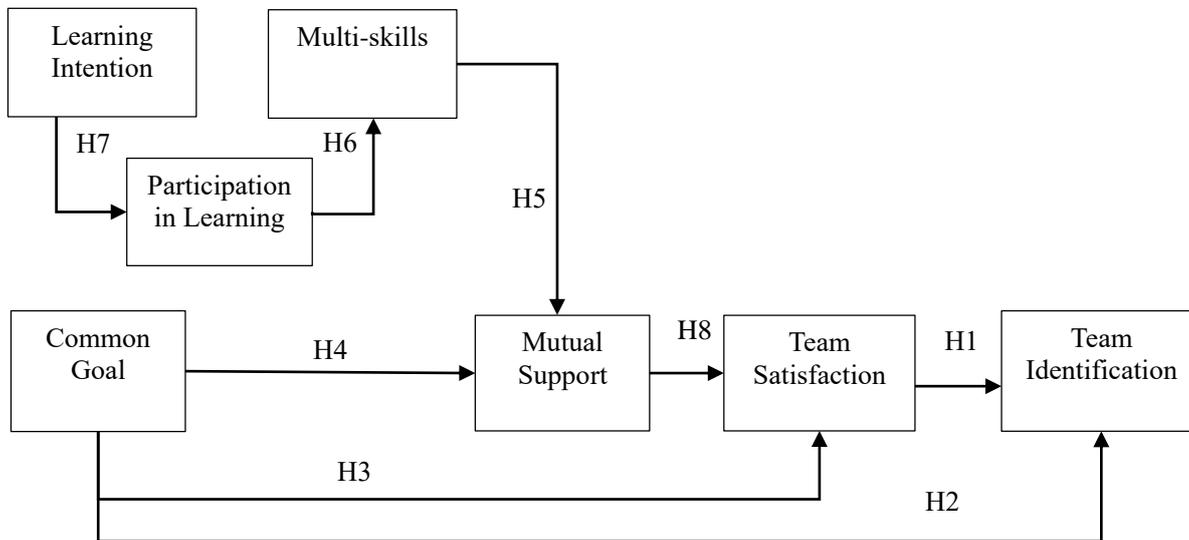
(H6: Participation in Learning has a positive effect on multi-skills)

(H7: Learning Intention has a positive effect on participation in Learning)

H8: Mutual support has a positive effect on team satisfaction

Note: even though H6 and H7 do not directly connect with the mechanism of team satisfaction, considering the causal effect of both factors, these hypotheses were included to the mechanism of team satisfaction because they are important factors to enhance multi-skill

Figure 1 Conceptual Framework of the Study (Hypothesised Model)



Source: Author’s Design

III Research Design and Methodology

Sample and Sample Features

The target survey fields for the study are two export-oriented tableware production factories (hereafter factory A and B) in Sri Lanka which represent almost all the tableware production industry of the country. The total workforce consists of 964 (factory A) and 1034 (factory B) and in which 850 and 892 workers are shop-floor level, respectively. Shop-floor workers are selected as a target population for this study. Self-structured questionnaires were distributed among 203 shop floor workers in factory A. Usable responses are 150 (74 per cent of response rate). As well, 210 shop-floor level workers were selected from factory B and 178 usable responses (84 per cent of response rate) could be collected. In sum, the sample size of the study was 413 and the usable response rate was 79 per cent. The survey was carried out in March, 2017.

According to the demographic data, the ratio of man and women is almost the same in factory A and more than three-fourths of production workers are women employees in factory B. Age and the tenure relating results are the same in both factories because the mean age level of the workers is 31-35 and the workers have more than 10 but less than 15 years work experience in the factory, on average. However, over 50 per cent of workers have more than 15 years work experience. Further, most of the workers have 13 years school education in both factory A and B (57.3 and 77 per cent, respectively).

Measures

Employee’s perception of a common goal (CG), employee’s multi-skills capability (MSK), participation in learning (PL), intention to learn more (LI), employee’s supportive behaviour (MS), team satisfaction (TS) and TID were measured creating a questionnaire by using the preceding research.

The responses were recorded on five- point Likert-type scales with “strongly disagree” to “strongly agree”. Questions were in Japanese and English. Before distributing the questionnaire, all items were translated to the Sinhala language.

Team identification (TID) was assessed by using two items, “I am a member of this work team” and “I strongly identify with the other members of my work team”, which were taken from Jackson (2002). (Cronbach’s alpha = 0.60)

Four items were adapted from Van Der Veegt et al. (2000) and Cammann et al. (1983) to evaluate *Team satisfaction (TS)* as “I am satisfied with my present colleagues (TS1)”, “I am pleased with my colleagues’ way of work (TS2)”, “I am very satisfied with work in this team (TS3)” and “I am satisfied with the friendliness of my team members (TS4)”. (Cronbach’s alpha = 0.80).

Mutual support (MS) was assessed by using the following five items which were taken from Morita (2008) and Champion et al. (1993); “If I got into difficulty at work, my section members would help me (MS1)”, “I help my workmates when they have work problems on the line (MS2)”, “If any problem occurred on my work, it could be resolved by discussing with my colleagues (MS3)”, “On my day off, when I finish my daily work, I may help someone who is not finished (MS4)” and “Members of my team share information with other team members about our work” (MS5). (Cronbach’s alpha = 0.71).

Common goal (CG) was measured by using three items such as, “I know our team’s final goal (CG1)”, “In my team, we are jointly responsible for workplace results (CG2)” and “In my team, we have a clear goal to be achieved as a team (CG3)” (Suzuki, 2011; Morita, 2008). These were translated from Japanese to Sinhala. (Cronbach’s alpha = 0.73).

Multi-skills (MSK), participation in learning (PL) and Learning intention (LI) were assessed with the items which were taken from Morita (2008), which have been used to evaluate teamwork in Japan, the United Kingdom and China. To evaluate

multi-skills, “I can perform more than one task in the team” is used. And, to measure participation in learning, “I expand my skills participating on the job trainings in the factory” and learning intention, “I want to learn new work tasks as much as possible” are used.

Analysis Method

Possibility of data aggregation into one sample is confirmed through the one- way ANOVA analysis, and the IBM SPSS statistic 23 is used.

As the main statistical analysis, to verify the hypotheses, path analysis is performed through the structural equation modelling (SEM) by using Amos v. 23.0. All model estimations are conducted using the maximum likelihood method.

Descriptive statistics; mean, standard deviation, correlation and reliability coefficient for each variable in the study are calculated by using the IBM SPSS statistic 23.

IV Results

Prior to the main analysis (testing hypotheses model), data of factory A and B are aggregated since there are no differences regarding all factors and items which are used in the study between both organizations. For instance, ANOVA values of TS (F=1.094, p=.296) and TID (F=0.920, p=.338) are not significant. Further, both organizations belong to the tableware production. Previously, Sakamo (2018) has also aggregated data of the manufacturing organizations in the same industry.

Table 1 reveals the correlations between TID and other factors and items, in which, comparatively, the relationships between TID and TS (r=0.597, p<0.01) is higher than others. Also, MS (r=0.397, p<0.01), CG (r=0.428, p<0.01), MSK (r=0.182, p<0.01), PL (r=0.127, p<0.05) and LI (r=0.186, p<0.01) presented the significant relationship with TID. Further, TS was significantly related with the other factors. Typically, the correlation value between TS and MS is (r=0.539, p<0.01), CG (r=0.590, p<0.01), MSK (r=0.249, p<0.01) and LI (r=0.220, p<0.01). As well, relationships between MS and CG (r=0.662, p<0.01), MS and MSK (r=0.358, p<0.01), and MSK and PL (r=0.316, p<0.01) and PL and LI (r=0.220, p<0.01) were significant. More, even though it was not hypothesised, there are significant positive relationships between MS and PL (r=0.243, p<0.01), MS and LI (r=0.343, p<0.01), CG and MSK (r=0.351, p<0.01), CG and PL (r=0.231, p<0.01) CG and LI (r=0.328, p<0.01) and MSK and LI (r=0.296, p<0.01).

Table 1 Study Variable Means, Standard Deviations and Correlations

	Mean (S.D)	TID	TS	MS	CG	MSK	PL	LI
TID	3.91 (.85)	1						
TS	3.69 (.87)	.597**	1					
MS	4.06 (.70)	.397**	.539**	1				
CG	3.86 (.85)	.428**	.590**	.662**	1			
MSK	4.13 (.67)	.182**	.249**	.358**	.351**	1		
PL	4.09 (.83)	.127*	.110	.243**	.231**	.316**	1	
LI	4.32 (.70)	.186**	.220**	.343**	.328**	.296**	.220**	1

Note: Valid N (list wise) =283

Mean values of TID, TS, CG and MS are grand mean.

*p<0.05 ** p<0.01

TID- Team Identification, TS- Team satisfaction, MS-Mutual support, CG-Common goal, MSK- Multi-skills, PL- Participation in learning and LI-Learning intention.

Table 2. Goodness of Fit Analysis (N=283)

Model	Fit-Indexes							
	χ^2 (df)	$\Delta\chi^2$	GFI	CFI	TLI	IFI	RMR	RMSEA
1	275.10*** (114)	2.413	.901	.881	.857	.882	.062	.07
2	229.67*** (112)	2.051	.917	.913	.894	.914	.040	.06

Note: χ^2 = the model chi-square; $\Delta\chi^2$ = CMIN/DF; GIF= Goodness of Fit Index; CFI= Comparative Fit Index; TLI= Tucker Lewis index; RMR=Root Mean Square Residual; RMSEA= Root Mean Square Error of Approximation.

Causal Relationship of Variables

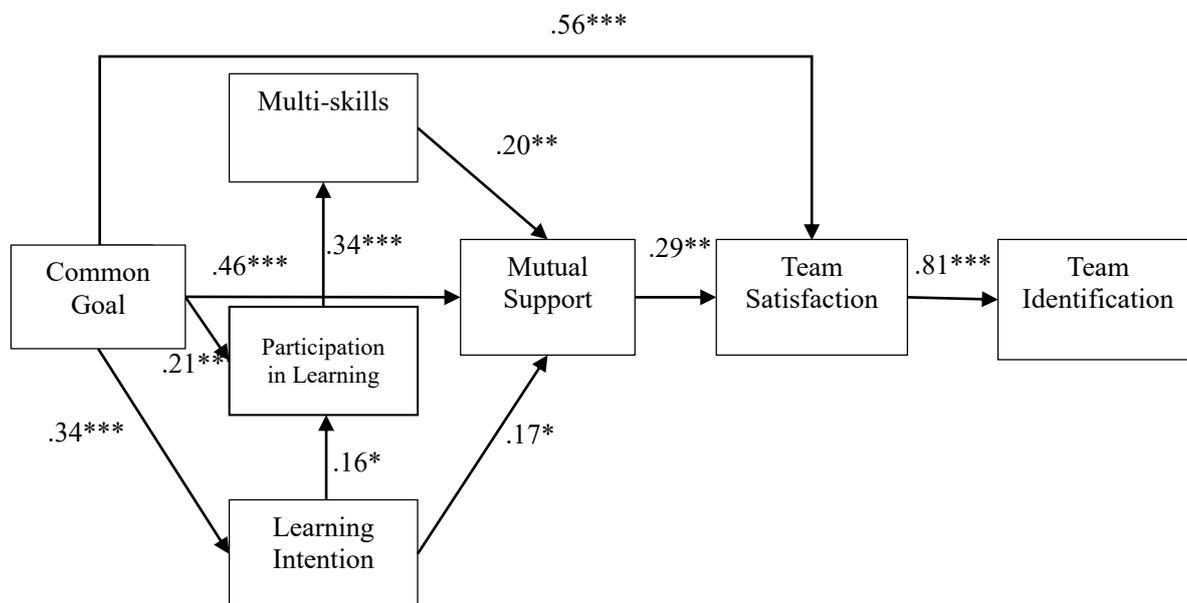
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The path analysis is performed through the structural equation modelling (SEM) to evaluate the relationships which were conceptualized into the hypothesised model (see Figure 1). The following goodness-of-fit indices provide information about the overall fitness of the empirical data to the models.

Paths which are demonstrated in the hypothesised model in Figure 1 are included in Model 1. However, the correlation result (Table 1) revealed that there are more relationships than which are in the hypothesised model and paths which are valid theoretically are added to Model 2 (Figure 2). According to Table 2, fit indices for Model 1 (as in Figure 1) were the overall chi-square being statistically significant ($\chi^2(114) = 275.10, p < 0.001$), CMIN/DF = 2.413, GFI = 0.901, CFI = 0.881, TLI = 0.857, IFI = .882, RMR = 0.062 and RMSEA = 0.07. However, the correlational data provided the significant relationships which were not hypothesised. Therefore, Model 1 was rearranged by considering all those relationships. As mentioned earlier, this study aims to evaluate whether TS enhances the TID, considering the mechanism of TS in the team, and SEM analysis suggested that Model 2 (see Figure 2) has the highest overall goodness-of-fit indices regarding the relationship of TS and TID. Typically, fit indices for Model 2 (Table 2) were the overall chi-square being statistically significant ($\chi^2(112) = 229.67, p < 0.001$); CMIN/DF = 2.051, GFI = 0.917, CFI = 0.913, TLI = 0.894, IFI = .914, RMR = 0.040 and RMSEA = 0.06. In general, a conceptualized model is accepted as a well-fitting one, when the CMIN/DF < 3 (Iacobucci, 2010), the chi-square is statistically not significant, RMSEA < 0.06 and other fit indices; GFI, CFI, TLI and IFI are 0.90 or greater and RMR < 0.05 (Hair et al., 2019; Oshio, 2017). Fit indexes of Model 1 are incompatible with general acceptance, as they are lower than the cut-off level of 0.9 and therefore, based on these explanations, Model 2 can be considered as the good model to explain the causal relationship of TS and TID.

According to structural coefficients which have been shown in Figure 2, TS has a positive effect on TID ($\beta = 0.81, p < 0.001$) thus supporting H1. However, CG has not made a significant direct effect upon TID because causal linkage between CG and TID is not significant at the 5 per cent level ($\beta = -0.09, p = .420$) thus H2 is not supported.

Figure 2 Estimated Structural Model



* $p < .05$, ** $p < 0.01$, *** $p < .001$
Source: The Analysis Results.

Next, hypotheses of the team satisfaction mechanism in the team are tested. According to Figure 2, CG has significantly positive direct effects on TS ($\beta = 0.56, p < .001$) and MS ($\beta = 0.46, p < .001$) supporting H3 and H4. MSK has a significantly positive effect on MS ($\beta = 0.20, p < .01$), supporting H5. Hypothesis 6 and 7 are concerned about the relationships of factors which are behind the MSK, and the empirical results supported both hypotheses since PL has a significantly positive direct effect upon MSK ($\beta = 0.34, p < .001$) and then LI has a significantly (low) positive direct effect upon PL ($\beta = 0.16, p < .05$). As well, even though it was not predicted, CG makes the significantly positive effect on PL ($\beta = 0.21, p < .01$) and LI ($\beta = 0.34, p < .001$) and LI makes the positive significant (low) effect on MS ($\beta = 0.17, p < .05$). Finally, MS has a significantly positive effect on TS ($\beta = 0.29, p < .01$), and H8 is supported

Further, Table 3 reports the direct, indirect and total effect of all variables on TID. As noticed above and depicted in Figure 2, TS had a direct effect on TID. As well, MS, CG, MSK, PL and LI had indirect effect on TID. The total effect of TS, MS, CG, MSK, PL and LI on TID were found to be 0.810, 0.237, 0.579, 0.048, 0.016 and 0.043, respectively.

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Table 3. Direct, Indirect and Total Effect on Team Identification

	Direct	Indirect	Total	
Team Satisfaction (TS)	.810	-	.810	
Mutual Support (MS)	-	.237	.237	
Common Goal (CG)	-	.579	.579	
Multi-Skills (MSK)	-	.048	.048	
Participation in Learning (PL)	-	.016	.016	
Learning Intension (LI)	-	.043	0.43	The Analysis Results.

V Discussions and Conclusion

The study was arranged to explore whether TS fosters TID, considering antecedents of TS. The SEM analytical results provided evidences to support hypotheses of the study. The first hypothesis is stated that TS enhances the TID. Findings (Figure 2 and Table 3) confirmed this hypothesis and it was compatible with the argument of the study. Even though most of previous studies have reported TID as a cause of employees’ satisfaction in the team (Michinov & Juhel, 2018; Hu & Liden, 2013; Van Dick et al., 2008; Riketta & Van Dick, 2005), findings of the study provide evidence that the opposite is also possible in the team, which has been proved by Su, et al. (2016) in the individual level identification and De Moura, et al. (2009) in the organizational level identification. It means that the workers are willing to express their inclusiveness in the team which they satisfied with. However, the study does not reject previous studies (Michinov & Juhel, 2018; Hu & Liden, 2013; Van Dick et al., 2008; Riketta & Van Dick, 2005) which revealed that TID enhances TS, but the study wants to insist that, conversely, TS is an important factor to improve employee’s belongingness in the team in which he or she works.

Further, it contradicts the previous research (Lin et al., 2017; Farmer et al., 2015; Hu & Liden, 2013) which has reported TID as a causal factor of MS, and the results suggested that MS in the team enhances the TID, however not directly but indirectly (Table 3). In turn, this relationship is mediated by TS. This points out that MS clearly can affect team members’ satisfaction about the team as a whole, and the evidence here suggests that this in turn affects TID. The present study also confirmed that the mutual support feature makes a positive significant effect on the team satisfaction. Regarding the relationship between TS and MS, the path coefficient value of mutual support presents enough evidence to testify to H8, in turn the study results corroborate findings of prior studies of Schreurs et al. (2015) and Champion et al. (1996).

As well, even though H2 was not supported, in common with previous research (Van der Veegt et al., 2003; Ashforth & Mael, 1989), the results suggested that there is a relationship between CG and TID. The study finds that CG creates an influence on TID via four indirect routes (Table 3), in which, the route via TS makes sound indirect effect on TID [CG→TS→TID, $\beta=0.454$ (0.56*0.81)] since the path coefficient result revealed that the employees’ awareness of CG has created the greatest significant positive effect ($\beta = 0.56$, $p<.001$) on TS. This result confirms the previous discussion regarding relationship between CG and TS (Stark & Bierly III 2009; Van de Vliert et al., 2001; Champion et al., 1996). Stark and Bierly III (2009) and Champion et al. (1996) have pointed out that equally shared responsibilities is the reason behind the relationship, and results of SEM (In my team, we are jointly responsible for workplace results- CG2→CG is $\beta = 0.73$, $p<.001$) provided the further supportive evidence to assent with them. Further, CG makes an effect on TID via MS and TS. As a process, CG enhances MS (Gonzalez-Mulé et al., 2014; Suzuki, 2013; Chen et al., 2009) and MS improves the TS and subsequently TS positively relates with TID, as discussed earlier.

The rest of the routes of CG to TID are mediated by MSK instead of MS and TS. As mentioned in the literature, MSK is also an inevitable factor to improve TS, since MSK helps to cultivate and grow the supportive activities in the team and this relationship was proved by the study (H5). As Kyndt et al. (2014) and Kyndt and Baert (2013) reported that workers’ actual participation in learning and intention to learn new things act as stimulations of skills attainment and the LI→PL→MSK relationship (Figure 2) confirmed these arguments. Meanwhile, even Kyndt and Baert (2013) have discussed about the individual and organizational level antecedents of participation of learning and learning intention of workers, however, they have not considered the relationship with characteristics of team such as common goal. The study results revealed the effect on LI and PL by CG. That is, having awareness regarding common goal of the team enhances the workers’ actual participation in learning and intention to learn new things because in the team, members work together to achieve their common goal supporting each other and having a wide variety of skills, i.e. MSK becomes an inevitable necessity, here, as has been discussed in the previous studies of teamwork (Morita, 2008).

As well, the evidence here suggests that LI makes effect on MS. This relationship means that employees who have intention to learn more participate in the supportive activities in the team. The literature says that workers can learn from their colleagues at the workplace, informally (Sakamoto, 2018; Sato, 2016). The present study has evaluated MS by using items such as “If any problem occurred on my work, it could be resolved by discussing with my colleagues (MS3)” and “Members of my team share information with other team members about our work” (MS5) and they have to some extent an informal training nature since an exchange of information and discussions about problems would share the knowledge among the members. However, the evidence

of the study suggests that the relationship is not so much powerful because the path coefficient result takes a lower value.

Theoretically, the present study confirmed that CG, MSK play substantial roles in the enhancement of MS among team members and altogether improve the TS that is to say, the mechanism of TS. Also, PL and LI became the influential factors for MSK. However, as a whole, only TS has a direct effect and MS and CG have an indirect effect on TID confirming that TID could be an outcome of TS and the fostering factors of TS. That is, the mechanism of TS, more or less, creates influence on TID.

Practically, Nanayakkara and Chandrika (2018) have insisted that manufacturing organizations have been struggling with high labour turnover, in the Sri Lankan context and improvement of TID would be a possible solution for this problematic situation since previous studies have found that identification decreases the employees' turnover intention (Li et al., 2015; Riketta & Van Dick, 2005). And workers' satisfaction is an important factor in this process (De Moura et al. 2009). Therefore, as the evidence of the present study suggested that organizations can improve TS by creating a team-based work environment in the work place.

However, there are several challenges for future research. First, even though the study concerns the team level identification, analysis was carried out only by considering the individual level because, a number of teams of the study (number of team=24) is insufficient to handle multilevel analysis to investigate the difference between teams since, Hair, et al. (2019) reported that at least 30 teams are wanted to carry out multilevel analysis. Therefore, future research explores the relationship between TID and TS increasing a number of teams and considering team level differences (Michinov & Juhel, 2018). Second, TID was measured narrowly, considering only cognitive identification, by using two variables. Hence, TID has to be evaluated putting considerations on other dimensions such as affective and evaluative identifications (Dimmock et al., 2005), in future studies. A final limitation concerns the variables which were used to measure skills related matters since, MSK, PL and LI were evaluated by using single items. Therefore, increasing validity, items should be increased in future studies.

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Review on: Recent achievement of seed priming in improving seed germination and seedling growth in adverse environmental conditions

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Abstract- Successful crop establishment and high seedling vigor are considered as an important factor for the success of most field crops, as these parameters contribute to uniform plant growth and maturity, better struggle with weeds, and high productivity. Abiotic stresses adversely affect plant growth and productivity. In recent years, seed priming has been developed as an essential method to produce tolerant crop plants against various stresses. Seed priming is a method which is potentially able to promote rapid and more uniform seed germination and seedling growth in adverse environmental conditions and enhancing yield of a certain field crops. Seed priming is the cellular state in which the harmful effects of abiotic stress factors in plants are hindered by pre exposure to a stimulus, thus resulting in greater survival. It is becoming increasingly evident that different seed priming techniques in plants can improve the tolerance of crops to adverse environmental conditions. Generally seed priming shows potential strategy for increasing crop production and management in adverse environmental circumstances. Seed priming for enhanced resistance to of adverse environmental conditions obviously is operating various pathways involved in different metabolic processes. The seedlings emerging from primed seeds showed early and uniform germination. Moreover, the overall growth of seedling and plant is improved due to the seed-priming treatments, so that farmers or any of crop producers should be practice and apply the science of seed priming for maximizing crop yield in any of adverse environmental conditions

Index Terms- Seed priming, seed germination, seedling growth

I. INTRODUCTION

B Background of the review

Doing well crop establishment and high seedling vigor are well thought-out as decisive factors for the success of most field crops, as these parameters contribute to uniform plant growth and maturity, better struggle with weeds, and high productivity. Therefore, improving seed vigor is the primary objective of the industry of crop production to enhance the critical and yield increasing stage of crop establishment. However, low vigor of seeds or adverse environmental conditions after sowing may cause slow seed germination and uneven seedling emergence under field conditions (Christos *et al.*, 2019). Therefore, seed treatment before sowing is the foundation for activation of seed resources that in combi

nation with external ingredients could contribute to the efficient plant growth and high yield. Various physiological and non physiological techniques are available for enhancing seed performance as well as to combat environmental constraints. The physiological treatments for improving seed germination and stand establishment are composed of seed hydration techniques such as humidification, wetting, and presoaking. The other techniques for promoting germination are comprised of chemical treatments, seed inoculation with beneficial microbes, and seed coating. Seed quality can determine the chance of producing healthy seedlings and sufficient plant population for achieving high yield. In practice, seed quality loosely reacts the overall of seed performance. Under field conditions, poor seed quality can delay the onset of germination, adversely affects seedling vigor, and reduce the final crop stand. Establishing rate affects crop entity and competitiveness of the crop stand, tillering or branching, and yield and thus is of great importance. Vigorous plants have high ability to capture resources, can better tolerate pests and plant pathogens, struggle with weeds, and are expected to be more tolerant to applied herbicides (Christos *et al.*, 2019).

Seed priming is a physiological method of controlled hydration and drying to enhance sufficient pre germinative metabolic process for rapid germination (Dawood, 2018). It has been reported that primed crop seeds emerged faster and grew more vigorously. They also flowered and matured earlier and gave higher yields, which is very important for adverse environmental condition such as drought prone area (Mamun *et al.*, 2018). More to the point the benefit of priming is to increase the rate of germination at any particular temperature. On a practical level, primed seeds emerge from the soil faster and often more uniformly than non-primed seeds because of limited adverse environmental exposure. Priming accomplishes this important development by shortening the lag or metabolic phase in the germination process. The metabolic phase occurs just after seeds are fully imbibed and just prior to radical emergence. Since seeds have already gone through this phase during priming, germination times in the field can be reduced by approximately 50% upon subsequent rehydration. Not only this, priming has been commercially used to eliminate or greatly reduce the amount of seed borne fungi and bacteria. In this framework, we have mentioned the following priming techniques on farm priming, Hardening, Hydro priming, Osmo hardening, Vitamin C (Ascorbate) priming (Mamun *et al.*, 2018). Moreover, seed priming has been shown to improv

seed performance under cold environmental conditions (Lin and Sung, 2001).

On the other hand, globally, soil salinization is one of the most important ecological issues of dry land agriculture and has become a major hindrance for the yield of field crops. Besides that, salinization is dispersal in irrigated lands because of inappropriate management of irrigation and farming (Abraha and Yohannes, 2013). Salinity causes a series of biochemical, physiological and metabolic changes in plants, so that different seed priming techniques has to develop for facing the challenges behind soil salinization and other abiotic crop stress on seed germination seedling vigor as well as crop productivity (Ibrahim, 2016). Therefore reviewing and gathering information based on the previous research finding, as well as identifying the knowledge and research gaps on the recent achievement of seed priming in improving seed germination and seedling growth in adverse environmental conditions is very important.

1.1. Objective of the review

- To review the recent achievement of seed priming in improving seed germination and seedling growth in adverse environmental conditions

II. REVIEW OF LITERATURE AND DISCUSSIONS

2.1. Definition of terms

Seed priming: Seed priming could be defined as controlling the hydration level within seeds so that the metabolic activity necessary for germination can occur but radical emergence is prevented. Different physiological activities within the seed occur at different moisture levels (Taylor *et al.*, 1998).

Seed germination: Seed germination commonly implies three distinct phases; consisting in Phase I: seed hydration process related to passive imbibitions of dry tissues associated with water movement first occurring in the apoplastic spaces; Phase II: activation phase associated with the reestablishment of metabolic activities and repairing processes at the cell level; and Phase III: initiation of growing processes associated to cell elongation and leading to radical protrusion. Phases I and III both involve an increase in the water content while hydration remains stable during Phase II. It is commonly considered that before the end of Phase II, germination remains a reversible process (Lutts *et al.*, 2016).

2.2. Recent achievement of seed priming in improving seed germination and seedling growth in adverse environmental conditions

Adverse environmental conditions significantly reduce seed germination plant growth, yield, and the marketable produce quality, with annually considerable economic losses as a consequence. Most of the adverse environmental conditions, including drought, salinity, extreme high and low temperature, high light, and pollutants, such as heavy metals or pesticides, result in oxidative stress that is an increase in the cellular levels of reactive oxygen species. Adverse environmental conditions stresses not only retard plant growth and diminish yield in case

of crop plants, but also severe stress can trigger programmed cell death (Petrov *et al.*, 2015). According to Yan Dai *et al.* (2017) Seed priming treatments, including hydro priming and comprehensive seed priming, can mitigate the effects of soda saline-alkali stress in soybean seedlings. Moreover, seed priming with ZnSO₄, CaCl₂, betaine hydrochloride and GA32 was found to be more effective than hydro priming to flourish under soda saline alkali stress. The better growth performance of soybean seedlings from comprehensive seed priming was related with a stronger osmotic adjustment, higher activities of the antioxidant defense system, more photosynthetic pigment contents, better membrane integrity and more added starch accumulation under soda saline alkali stress. Sorghum seeds responded well to priming treatments consisting of N, Zn solutions or water. Priming sorghum seeds with Zn solution for 10hour duration dramatically improved the germination percent, germination index, and reduced mean germination time compared to the unprimed seeds. Priming seeds with Zn for 10 h had also a profound effect on vigor and seedling growth parameters and increased the seedling height, seedling dry weight, and seedling vigor index-1 and 2 as compared to unprimed seeds. Among sorghum varieties studied, varieties Melkam followed by Dekeba and Teshale with 10 h priming duration performed better than the other varieties with respect to the majority of the traits studied. Priming of sorghum seeds for 10h is an optimum priming duration for most of the varieties. Moreover, the use of limiting nutrients such as Zn as seed priming agent would be an excellent option to improve germination, seedling growth, and its vigor. However, in the absence of Zn or urea, farmers have the option to use water to prime their seeds to enhance seedling germination and stand establishment (Wondemu *et al.*, 2018). In addition this Reduction and delay in the germination of spring maize (*Zea mays L.*) may be a problem due to low soil temperatures and low water potentials. However, seed priming is used to improve rate and speed of germination, and expand temperature limits for germination under normal and stressful conditions. Maize seeds were subjected to hydro priming, hormonal priming with 100 mg L or IAA solutions and halo priming with 50m M CaCl₂ or 50 mg L ascorbate (ASA) for 24h. All pre sowing seed treatments resulted in a higher germination percentage and germination index, lower mean germination time and mean emergence time. All seed treatments resulted in higher seedling fresh and dry weight compared with that of control with maximum dry weight recorded for seeds subjected to ASA, CaCl₂ and GA. Performance was better in seeds subjected to CaCl be ascribed to the effect of lower ASA followed by GA 503 3-1 GA for 24 h than for the other priming agents. This could, higher reduce and total sugars as well as higher α-amylase activity (Afzal *et al.*, 2008).

Singh *et al.* (2014) declared that primed corn seeds under adverse environmental condition had a better chance for producing a good crop with higher economic yield. Moreover seed priming has

practical implications in improving performance of vegetable crops under stressed environmental conditions such as salinity, drought, low and higher temperature (Piri, 2009). Further more, the chitosan priming increased the chilling tolerance of maize seedlings confirmed by improving germination speed, and shoots and root growth and maintaining membrane integrity and higher

activities of antioxidant enzymes. The 0.50% chitosan seems to be a suitable concentration for seed priming (Guan *et al.*, 2009). According to Afzal *et al.* (2012), Seed priming was effective in inducing chilling tolerance in maize through modulation of vigor associated attributes such as hydrolytic enzyme activities, chlorophyll and carbohydrate metabolism. Among priming agents, priming with Moraga leaf extract seems more practical being less expensive, non-toxic and the most effective in increasing the ability of maize plants to withstand low temperature. Hence, seed priming with Moraga leaf extract can be recommended after extensive field appraisal across a wide range of environments and genotypes to improve the performance of early spring planted maize. Seed priming treatments such as selenium and salicylic acid priming were tested in field and growth chamber experiments and the results revealed that under chilling stress, seed priming increased the rice seed germination by 20.96 up to 26.31%. The length and weight of shoots and roots were also significantly increased. The improved germination and seedling growth of primed seeds under chilling stress were strongly linked with higher α -amylase activity and total soluble sugar content (Wang *et al.*, 2016). Similarly, twenty-four diverse maize inbred lines were primed using a synthetic solid matrix and then exposed to 10°C soil conditions. Chilling substantially reduced total emergence for two of 24 genotypes evaluated. For these genotypes, priming provided protection allowing nearly full emergence. Priming significantly reduced mean emergence time and increased the emergence uniformity of chilling sensitive genotypes. The results suggest that the cold sensitive genotypes may benefit from priming pretreatment (Hacisalihoglu *et al.*, 2018). Jafar *et al.* (2012) concluded that, among the different priming agents used, osmo-priming with CaCl and ascorbate priming was the most effective in alleviating salt stress effects on grain yield irrespective of wheat varieties. Physiologically, the beneficial effect of this priming treatment can be attributed to increased accumulation of soluble proteins, phenolics, soluble sugars and K²⁺ with simultaneous decrease in Na⁺ uptake. These treatments can therefore be employed to improve the performance of wheat under saline conditions. Seed priming with Se or SA, was found to be more effective under chilling stress. The better germination and vigorous growth of primed rice seedlings was associated with; higher starch metabolism, enhanced respiration rate, better membrane integrity, higher metabolite synthesis, and increased activities of antioxidants in these seedlings (Hussain *et al.*, 2016). Priming of maize hybrid seeds with in 50, 100 and 150 ppm (mg l) aerated solutions of SA for 24 h and were dried back. Treated and untreated seeds were sown at 27°C (optimal temperature) and at 15°C (chilling stress) under controlled conditions. Performance of maize seedlings was hampered under chilling stress. But seed priming with SA improved the seedling emergence, root and shoots length, seedling fresh and dry weights, and leaf and root score considerably compared with control both at optimal and chilling temperatures. However, priming in 50 mg l SA solution was more effective, followed by priming in 100 mg l. Seed priming with SA improved the chilling tolerance in hybrid maize mainly by the activation of antioxidants. Moreover, maintenance of high tissue water contents and reduced membrane permeability

also contributed towards chilling tolerance (Farooq *et al.*, 2008).

According to Christos *et al.* (2019) the effects of hydro-priming for 0, 8, 16, 24, 36, and 48 hours on final germination percentage, germination speed, germination index, mean germination time, mean daily germination, synchronization index, and seedling vigor index were studied. Average over priming duration treatments, hydro priming improved germination speed by 16.2%, germination synchrony by 20.7%, and seedling vigor index by 13.4%, but did not affect significantly final germination percentage and mean daily germination compared with non-primed seeds. In field trials, seed priming for 8 h resulted in higher fresh weight at anthesis by 22.3% and 8.6% in the first and the second year than the non-primed control. Similarly, seed priming for 8 h provided higher seed yield by 12.0% in the first year and by 5.9% in the second year compared with non-primed control. Overall, seed hydro-priming accelerated faba bean germination and seedling emergence in the field, but the magnitude of the response was associated with the environment and was more evident under limited soil moisture after sowing, whereas the beneficial effect of priming was masked when rainfall followed sowing. Similarly, the beneficial effect of priming on seed yield was more pronounced with limited soil moisture after anthesis. As hydro-priming is a simple technique, evaluating the efficiency of this priming method in deferent environmental conditions is essential to optimize our chosen priming technique. Molecular priming is evolving as an efficient technology to counteract the adverse effects of abiotic stresses. It is environmentally friendly and applicable to a wide variety of species. The priming agents can be applied only at critical times, for instance just before an upcoming stress, such as chilling or drought, and at discrete developmental stages susceptible to stress (such as fruit set), to maximize their efficiency. In contrast, this flexibility poses certain challenges. An accurate weather forecast and readiness to apply priming agents as environmental conditions change would be crucial for the exploitation of their full potential (Kerchev *et al.*, 2020).

During the early spring or late autumn cultivation periods, the delaying effect of low temperature on germination of lettuce seeds can be significantly compensated with a short period of priming with aqueous solution of vitamin U. Vitality of the photosynthetic apparatus, which converts incident light energy into chemically stored energy, as well as uptake, and assimilation of carbon dioxide by leaves are less inhibited by cold stress if hydroponically grown lettuce plants are primed with millimolar amounts of vitamin U dissolved in the nutrient medium. Leaves of lettuce plants primed with 0.25-2 mM vitamin U have higher vitamin C content and less reduced carotenoid content upon growth at low temperature, thus they have a higher quality as health promoting food source (Fodorpataki, 2019). Similarly, Priming can improve cold tolerance of lettuce in its early developmental stages, resulting in more efficient cultivation and better quality for human consumption. The first reports on the beneficial influence of priming with vitamin U on photochemical efficiency of photosynthesis, on carbon dioxide assimilation, on carotenoid pigment and ascorbic acid content of lettuce leaves exposed to cold

stress. The fact that effects of priming are not proportional with concentration suggests that vitamin U may act as a signaling molecule to boost physiological performances through improvements in anti stress pathways that involve sulfur containing compounds. Further investigations are needed to elucidate the mechanism of action vitamin U in plants exposed to different environmental stresses taking into account that scientific information regarding the role of this biologically active natural metabolite is very scarce (Fodorpataki, 2019). Seed priming with CaCl₂, GA₃, and H improved *I. indigotica* Fort. Seed germination and seedling growth under salt stress. The optimal concentrations were 15 g/L for CaCl priming, 0.2 g/L for GA for H₂O₂ priming, and 40 mM priming. Seed priming treatments greatly promoted SOD, POD, and CAT activities and alleviated the oxidative damage induced by salt stress in *I. indigotica*. Therefore, it may be concluded that seed priming is a promising approach to accelerating *I. indigotica* growth under salt conditions (Jiang *et al.*, 2020). Pretreatment of *Arabidopsis* plants with *A. nodosum* extracts activates partial closure of stomata and modifies ABA signaling and antioxidant systems. These preactivation results in enhanced protection when a secondary drought stress stimulus is detected (Santaniello *et al.*, 2017). *Arabidopsis*, tomato, and pepper plants primed with an extract from *A. nodosum* are completely protected against paraquat-induced oxidative stress. At the molecular level, the seaweed extract treatment can modulate micro RNAs, which are key regulators of gene expression, and enhance tolerance to salt stress (Shukla *et al.*, 2018). Different structurally unrelated endogenous and synthetic organic molecules have been shown to prime plants against stress. The external application of acetic acid, for example, improved drought tolerance in *Arabidopsis*, rapeseed, maize, rice and wheat plants. This evolutionarily conserved priming mechanism relies on the promotion of jasmonic acid (JA) synthesis and enrichment of histone H4 acetylation that serves as an epigenetic switch by which plants adapt to drought (Kim *et al.*, 2017). Generally and more to the point primed seed can increase their germination characteristics as compared to the unprimed seeds. The highest germination characteristics were obtained from priming by halo and hydro priming which was performed in control conditions. Besides that Priming can improve seed reserve utilization such as: weight of utilized seed reserve, seed reserve utilization efficiency and seedling growth in millet seeds under salinity stress (Aghbolaghi and Sedghi *et al.*, 2014). Abiotic stress protection in plants could be mediated by stimulating memory responses at the genetic level (De Palma *et al.*, 2019) but could also be improved by pretreatment with several non pathogenic bacterial strains. Thus the belowground interactions between these beneficial bacterial strains and plants have the capacity to prime and activate defense response (Mhlongo *et al.*, 2018).

III. CONCLUSION AND RECOMMENDATION

3.1. Conclusion

It can be concluded that:

- Seed priming is a method which is potentially able to promote rapid and more uniform seed germination and seedling growth in adverse environmental conditions and enhancing yield of a certain field crops
- Seed priming is the cellular state in which the harmful effects of abiotic stress factors in plants are hindered by pre-exposure to a stimulus, thus resulting in greater survival.
- It is becoming increasingly evident that different seed priming techniques in plants can enhance the tolerance of crops to adverse environmental conditions. Generally seed priming shows potential strategy for increasing crop production and management in adverse environmental conditions such as high or low temperatures, drought, cold environment, salt stress areas.

3.2. Recommendation

It can be recommended that:

- Seed priming for enhanced resistance to of adverse environmental conditions obviously is operating various pathways involved in different metabolic processes. The seedlings emerging from primed seeds showed early and uniform germination. Moreover, the overall growth of seedling and plant is improved due to the seed-priming treatments, so that farmers or any of crop producers should be practice and apply the science of seed priming for maximizing crop yield in any of adverse environmental conditions.
- Further research is needed in order to create the global image of seed priming phenomena against environmental challenges as well as to characterize specific priming related protein indicators in crop plants.

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Institutional Ownership, Managerial Ownership And Earning Management

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Abstract - The purpose of this study is to examine the effect of institutional ownership and managerial ownership on earnings management. By taking the population of manufacturing companies that listed in Indonesia Stock Exchange (IDX) in 2017-2018, this research is conducted using quantitative method with regression analysis. This research showed that institutional ownership and managerial ownership had no effect on corporate earnings management.

Index term: Institutional ownership, Managerial ownership, Earnings management, Good corporate governance

I. INTRODUCTION

The separation of ownership and control in corporate organizations creates an asymmetric information problem between shareholders (principals) and managers (agents) that is show the existence of an agency risk. Asymmetry information creates a moral hazard problem when managers have an incentive to pursue their own profits with costs incurred by shareholders (Scott, 2012), this condition shows that difference information content will causes agency problems. The existence of this agency problem made management tends to present information that is not true to the shareholders, especially if the information is related to the management performance measurements and will be affect the level of investment in the company. To ensure that their bonus performance and investment in the company is still obtained, management will conduct earnings management so that the company's performance is good.

Earnings management is the selection of accounting policies from existing accounting standards by managers that can be used to maximize their profits and or the market value of the company (Scott, 2012). The problem of earnings management can be overcome by having good corporate governance so that agency risk can be reduced. By increasing supervision of management actions, limiting managerial opportunistic behavior, and improving the quality of the company in the flow of earnings management information in the company can be minimized. Herawaty (2008) revealed that one way to suppress earnings management is by a mechanism of good corporate governance. Good corporate governance through internal mechanisms such as the composition of the board of directors or commissioners, managerial ownership and executive compensation as well as external mechanisms such as market control and levels of financial debt can help reduce earnings management. Good corporate governance with its mechanism provides a way for companies to suppress earnings management by offering shares that can be owned by internal and external parties, such as managerial ownership and institutional ownership

Sujono and Soebiantoro (2007) in Sabrina (2010) explained that managerial ownership is the ownership of shares by company management as measured by the percentage of the number of shares owned by the management. The managerial ownership structure can be explained through two points of view, namely the agency approach and the imbalance approach. The agency approach considers the managerial ownership structure as an instrument or tool used to reduce agency conflict between several claims against a company. The information imbalance approach views the mechanism of managerial

ownership structure as a way to reduce information imbalance between insider and outsider through information disclosure within the company. Increasing managerial ownership is a way to overcome the problems that exist in the company because with increasing managerial ownership, managers will be motivated to improve their performance so that in this case will have a good impact on the company and meet the wishes of shareholders. The larger managerial ownership in the company will drive the management to be more active to improve their performance because management has the responsibility to meet the wishes of shareholders who are none other than himself. Management will be more careful in making a decision, because management will share the benefits directly from the decisions taken. In addition, management also bears losses if the decisions taken by them are wrong.

Institutional ownership is ownership of shares by the government, financial institutions, legal entity institutions, foreign institutions, trust funds and other institutions at the end of the year (Shien, et. al. 2006 in Winanda, 2009). One factor that can affect company performance is institutional ownership. The existence of institutional ownership in a company will increase the supervision of management performance, because ownership of shares represents a source of power that can be used to support or vice versa on the performance of management. Supervision by an institutional investor is very dependent on the amount of investment made. Cornet et al. (2006) conclude that the supervision of company by the institutional investors can encourage managers to giving more attention on company performance so that it will reduce manager selfish behavior so the financial statements produced by management will have more integrity. Based on that background we compiled research questions as follows:

- Does managerial ownership affect earnings management?
- Does institutional ownership affect earnings management?

This research tries to answer the research question above and give a new understanding on how the typical of ownership will affect the earning management practices in Indonesia's manufacturing companies. This research is arranged by quantitative method with regression analysis. The population used in this research is manufacturing companies listed on the Indonesia Stock Exchange (IDX) during 2017-2018.

The result of this research concludes that institutional ownership influences earnings management, whereas managerial ownership does not affect earnings management in the manufacturing companies in 2017-2018. This research is arranged in introduction, theory and hypotheses development, research method, analysis and discussion, and conclusion.

II. THEORY AND HYPOTESIS DEVELOPMENT

Agency Theory

When there is a separation between the owner (principal) and the manager (agent) in a company, then there is a possibility that the owner's wishes are ignored. When the owner or manager delegates the decision-making authority to the other party, there is an agency relationship between the two parties. This agency relationship, such as between shareholder relations with managers, will be effective as long as managers make investment decisions that are consistent with the interests of shareholders. However, when the manager's interests differ from those of the owner, then the decisions taken by the manager will most likely reflect the preferences of the manager compared to the owner.

In accordance with the agency theory, a selfish manager will act in ways that improve their own well-being without regard to the interests of shareholders, therefore owners who have delegated decision-making authority to their managers can lose their potential benefits that should be derived from strategies that are optimize the desires of the owner (Leventis and Dimitropoulos 2012).

In general, the owners want to maximize the value of shares. When managers also own a large number of shares of the company, they will definitely choose a strategy that generates an appreciation of the value of shares. However, when a manager acts more as a hired person than as a partner and owner, the manager will prefer a strategy that can increase their personal compensation and not a strategy that focuses on returning to the owner (Pearce and Robinson 2008).

Agency theory is a theory that discusses the relationship between principal and agent. Agency theory is a sacrifice that arises from any agency relationship, including relationships in employment contracts between shareholders and company managers (Mishkin 2008). This agency theory emphasizes the

importance of handing over company operations from owners (principals) to other parties who have the ability to better manage the company (agents) (Irfan 2002).

Positive Accounting Theory

Opportunistic actions that underlie earnings management can be explained through positive accounting theory as well as the three hypotheses formulated by Watts and Zimmerman (1986). First, the bonus plan hypothesis explains how incentives in the form of bonuses offered to management to achieve certain targets can motivate the selection of accounting procedures that allow a shift in the future earnings to current periods. Second, the debt covenant hypothesis explains that companies that have a large ratio between debt and equity tend to choose and use accounting methods with higher income statements and tend to violate debt agreements if there are benefits to the company, such as profit play so that debt obligations can be delayed for the next period. Third, the political cost hypothesis explains how these costs affect management in choosing accounting procedures that can keep the company from being noticeable so as to avoid government intervention and regulators such as the imposition of higher taxes or other demands (Sulistyanto, 2008).

Earning Management

Earning management can be explain as the choice of accounting policy by the manager to increase or decrease the amount of income reported with the managerial efforts to change, conceal, and delay information in financial statements by achieving certain objectives (Sulistyanto 2008). Reporting interventions in the external financial reporting process with the intention that users have a false information of the economic performance of the company so that the decisions taken by its users are in line with management's expectations to increase the value of the company (Schipper 1989).

Based on previous research conducted by Roychowdhury (2006) the measurements of earnings management are as follow:

- a. Abnormal cash flow operations (CFO)
Abnormal CFO is a profit manipulation that is done by a company through cash flow operations that will have cash flow lower than its normal level.
- b. Abnormal production cost (PROD)
Abnormal production costs are real earnings management which is done through manipulation of production costs, where the company will have higher production costs than the normal level.
- c. Abnormal discretionary expenses (DISC)
Abnormal discretionary expenses are profit manipulations carried out through research and development costs, advertising costs, sales costs, administration, other general costs.

Effect of Managerial Ownership on Earnings Management

Managerial ownership is ownership of share by the management of the company. From the standpoint of accounting theory, earnings management is largely determined by the motivation of company managers. Managerial ownership has a significant effect on earnings management. With the ownership of shares owned by the manager, the manager will act in harmony with the interests of shareholders so as to minimize the manager's opportunist behavior. In a low share ownership, the incentives for the possibility of opportunistic behavior of managers will increase.

Managerial ownership is considered as an important internal monitoring tool to resolve agency conflicts between external stockholders and company management. Managerial ownership is one factor that can reduce agency problems because it will align the interests of managers and shareholders. Putri and Yuyetta (2013) research found that managerial ownership had a negative effect on earnings management. Its explains that the larger the managerial ownership, the smaller the percentage of earnings management. Conversely, the smaller managerial ownership, the larger the percentage of earnings management. High share ownership makes company managers feel the benefits directly from economic decisions taken and bear the consequences of making wrong decisions. This shows that there is a greater responsibility for managers in managing the company and presenting financial statements with honest and candid information because the results of the financial statements are also for themselves. Managerial ownership will encourage

managers to produce optimal company performance and motivate managers on their accounting activities because they will share the consequences of their actions.

But on the other-hand there are studies that find different results which conducted by Agustia (2013) and Guna and Herawaty (2010). They found that managerial ownership has no effect on earnings management. This is because managers who participate in owning shares in the company will tend to take policies to manage the company's profits in accordance with the views desired by investors. For example, managers are thought that by increasing profits reported in a company's financial statements many investors will be interested in buying the company's shares or investing in the company and thus will increase the company's stock price. It was also due to the fact that managers who also own company shares only have relatively very small shares when compared to the overall capital in the company. Upon developing this hypothesis, the hypotheses of this study are:

H1: Managerial ownership affects earnings management

Effect of Institutional Ownership on Earnings Management

Institutional ownership is ownership of shares owned by other institutions. This is one way to monitor the manager's performance in managing the company so that ownership of other institutions is expected to reduce the earnings management behavior of managers. Institutional ownership has the ability to control management through an effective monitoring process. Evidence that the supervisory actions taken by a company and institutional investors may limit the behavior of managers. Institutional investors are parties who can monitor agents with a large ownership, so that the motivation of managers to manage profits is reduced.

Institutional ownership has the ability to control management through effective monitoring processes so that managers will be careful if they want to do earnings management. Institutional ownership is considered a way to oversee managers because an increase in institutional ownership will be able to reduce agency cost on debt and insider ownership because the greater institutional ownership will further reduce conflicts between creditors and managers and ultimately will reduce agency costs and earnings management.

Research by Guna and Herawaty (2010); Agustia (2013); and Putri and Yuyetta (2013) found that institutional ownership had no effect on earnings management. So, in this case institutional ownership is not an effective and efficient thing in reducing or hindering earnings management carried out by company management. So whether or not there is institutional ownership in this case is not an important thing for the company. Upon the development of this hypothesis, the hypothesis of this study is:

H2: Institutional ownership influences earnings management

III. RESEARCH METHODS

The research is using a quantitative approach by testing hypotheses. The operational definition of variables in this study is :

1. Managerial Ownership

Managerial ownership is the proportion of shares owned by the directors, management, commissioners as well as every party directly involved in the decision making of the company concerned. Managerial ownership measured by the percentage of share ownership of the board of directors and board of commissioners divided by the number of shares outstanding (Rustiarini, 2010).

2. Institutional Ownership

Institutional share ownership is a presentation of ownership rights of shares owned by other parties or institutions. Institutional ownership can be calculated by a percentage of the value of the number of shares of companies owned by the institution divided by the total number of shares outstanding. Here are the measurements:

3. Earning Management

Earnings management is the manager's effort to intervene or influence the information in the financial statements, to trick the principal who wants to know the performance or condition of the company. The accrual-based model is one of the models that uses discretionary accruals as a proxy.

Earnings management in this study is proxied by discretionary accruals. Discretionary accruals are a component of managerial engineering accruals by utilizing freedom and discretion in estimating and using accounting standards. Earnings management uses modified Jones by assuming that all changes in credit sales in the event period are the object of earnings management. This is based on the idea that it is easier to manage discretionary profits on the recognition of income on credit sales. Then to measure discretionary accruals, the Jones model is defined as the residual regression of total accruals from changes in sales and fixed assets, where the variable income changes adjusted for the variable changes in receivables that occurred in the period concerned. (Dechow *et al.*, 1995).

- a. Calculates the total value of accruals (TACC):

$$TACC_{it} = NI_{it} - CFO_{it}$$

- b. Calculate parameter values α , β_1 , β_2 , and β_3 as follows:

$$\frac{TACC_{it}}{A_{it-1}} = \alpha \left(\frac{1}{A_{it-1}} \right) + \beta_1 \frac{(\Delta REV_{it} - \Delta REC_{it})}{A_{it-1}} + \beta_2 \left(\frac{PPE_{it}}{A_{it-1}} \right) + \beta_3 \left(\frac{\Delta CFO_{it}}{A_{it-1}} \right) + \varepsilon_{it}$$

- c. Calculate non-discretionary accruals by entering the calculation results of the parameter values α , β_1 , β_2 , and β_3 from equation to value a, b1, b2, and b3 on the equation below:

$$NDACC_{it} = a \left(\frac{1}{A_{it-1}} \right) + b_1 \frac{(\Delta REV_{it} - \Delta REC_{it})}{A_{it-1}} + b_2 \left(\frac{PPE_{it}}{A_{it-1}} \right) + b_3 \left(\frac{\Delta CFO_{it}}{A_{it-1}} \right)$$

- d. Calculate the value of discretionary accruals by subtracting TA from NDACC as follows:

$$DACC_{it} = \frac{TACC_{it}}{A_{it-1}} - NDACC_{it}$$

Explanation:

$TACC_{it}$ = Total company Accruals i in period t

$DACC_{it}$ = Company Discretionary Accruals i in period t

$NDACC_{it}$ = *Non Discretionary Accruals of the company i in period t*

NI_{it} = *Net Income of company i in period t*

ΔCFO_{it} = Change in Cash Flow from Operating company i in period t

A_{it-1} = Company assets i in period t-1 (beginning of the year)

ΔREV_{it} = Changes in company income i in period t

ΔREC_{it} = Changes in company receivables i in period t

PPE_{it} = Company fixed assets i in period t

ε = *Error*

Population and Sample

The population used in this research is manufacturing companies listed on the Indonesia Stock Exchange (IDX) during 2017-2018. Samples taken from the population must be truly representative. The sampling method that is used in this study is the judgment sampling method, which is one form of purposive sampling by taking a predetermined sample based on the aims and objectives of the study. The criteria used in this study are:

1. Manufacturing companies listed on the Indonesia Stock Exchange during 2017-2018.
2. Manufacturing companies that publish financial reports or annual reports in a row during the 2017-2018.

IV. ANALYSIS AND DISCUSSION

Classic assumption test

Regression testing conducted on the regression equation will be tested on classical assumptions consisting of normality test, multicollinearity test, heteroskedasticity test and autocorrelation test. Following are the test results from the SPSS :

- a. Normality test

The results of the normality test can be seen in the following table:

Tabel 1

The results of the normality test

Model	<i>Asymp. Sig (2-tailed)</i>
-------	------------------------------

1	0,000
---	-------

Source: SPSS Processed Results, 2020.

From the classical assumption test table it can be seen that the level of significance of the Kolmogorov-Smirnov one sample shows the number 0.00 which means it is smaller than 0.05 so it can be concluded that the data is normally distributed. This is supported by Gujarati (2004: 109) stating that "... it can be shown that if there is a large number of independent and identically distributed random variables, then with a few exceptions the distribution of their sums tends to a normal distribution ...". The statement shows that large amounts of data will cause the data to become normally distributed by themselves. In addition Gujarati (1995: 782) states that if the data amounted to > 25, including a large sample, so this study is normally distributed because it includes a large category that is amounted to 312.

b. Multicollinearity Test

Multicollinearity test aims to test whether the regression model found a correlation between independent variables (independent) (Ghozali, 2012). Multicollinearity can be seen from the value of tolerance and its opponents as well as the variance inflation factor (VIF). Both of these measurements indicate which of each independent variable is explained by other independent variables. From the multicollinearity test table it can be seen that the VIF value for variables is less than 10 for variables in the regression model 1. It was concluded that the regression model 1 does not have multicollinearity between the independent variables in the regression model, because the VIF value <10 and tolerance value > 0.1 are meaning that there is no multicollinearity. Multicollinearity test results can be seen in the following table:

Tabel 2
 Multicollinearity Test Result

Variabel	Tolerance	VIF	Result
KINTS	0,810	1,234	Free of Multicollinearity
KM	0,949	1,054	Free of Multicollinearity

Source: SPSS Processed Results, 2020.

c. Heteroscedasticity Test

From the heteroscedasticity graph produced from SPSS, it can be seen that the plot graph is between the predicted value that is ZPRED with the residual value SRESID. There is no specific pattern, and the pattern of dots spread on the scatterplot graph so that it can be concluded that heteroscedasticity does not occur.

d. Autocorrelation Test

The autocorrelation test aims to test whether in the linear regression model there is a correlation between the error of the intruder in the t period and the error of the intruder in the t-1 period (before). The method that can be used to detect the presence or absence of autocorrelation is the Durbin Watson test (DW Test). DW tests are only used for first-order autocorrelation and require a constant (intercept) in the regression model and there are no more variables between independent variables. The autocorrelation test aims to test whether in the linear regression model there is a correlation between the error of the intruder in the t period and the error of the intruder in the t-1 period (before). To find out whether or not there is autocorrelation, you can do a statistical test from Durbin Watson (DW test). To test the presence or absence of autocorrelation, the Durbin Watson criteria is located -2 to +2. In this study the results of the Durbin Watson test resulted in a value of 1.808, so that the regression model did not occur autocorrelation.

Effect of Institutional Ownership on Earnings Management

This study found that institutional ownership had no effect on earnings management. Chung *et al.* (2002) stating that ownership of shares is in a large amount, tends not to be actively traded in the market and is usually owned in a long term period. When there is a tendency to own shares in the long run, institutional

ownership will be concerned with the underlying profitability of the company and will be very concerned with the use of discretionary accruals to manipulate earnings, which is a form of camouflage of management performance. Soloman (2007) in Sabrina (2013) states that institutional investors represent a strong mechanism of corporate governance that can monitor and align management interests with the interests of shareholders. Huang et al. (2011) states that the majority of investors' voting power is related to the low discretionary accruals. Gumilang et al. (2015), Chung et al. (2001), Bushee (1998) states institutional ownership has a significant negative effect on earnings management, because the majority owner prevents management from taking advantage of their discretion in choosing policies to increase or reduce reported profits with the aim of obtaining personal profit. In the case of PT Ades Alfindo 2004, the entry of new institutional investors managed to find inconsistencies in sales for the 2001-2004 period by earnings management. In accordance with ISA 260 paragraphs A1-A8, institutional investors can become Those Charged with Governance (TCWG) as an organization with responsibility for overall oversight of the strategic direction of the entity and accountability obligations, including overall oversight of the financial reporting process.

Effect of Managerial Ownership on Earnings Management

This study found that managerial ownership has no effect on earnings management. A very small proportion of ownership does not become an instrument of equality of interests with shareholders and has not formed a sense of belonging to the company (Maksum, 2005). That is why managerial ownership has no effect on earnings management. Scholer's study (2005) states that management discretionary controls reported profits using accrual policies and no matter how stringent accounting regulations, managers will use their influence to intervene reported earnings. Giving shares to management should be an incentive for management to reject interventions that want to interfere in managerial matters, especially if done will harm the public. Huang et al. (2011) precisely managers use their ownership as a protector of themselves from disciplinary actions by shareholders, consequently management is free or free to improve earnings management.

Zaki (2014) and Sudjatna and Muid (2015) explained that shares given to company managers that are relatively very small have not been able to influence earnings management activities carried out by company managers. With the authority as a company owner and manager of operational activities, managers will be more flexible in managing earnings because they have information that is not owned by external investors, so they can take advantage of this information. In this condition, giving ownership to management would lead to higher earnings management. It could be said whether or not the shares owned by management did not affect the pattern of earnings management. Sulistyanto (2008) added, the compilers of financial statements chose to use accounting methods or estimated values according to specific objectives either to increase share prices for the value of the company or to optimize their personal well-being both as managers and owners.

V. CONCLUSIONS

This research concludes that institutional ownership influences earnings management, because the majority owner prevents management from using their discretion in choosing policies to increase or reduce reported profits with the aim of obtaining personal profit.

Whereas managerial ownership and the suitability of the characteristics of the audit committee with corporate governance guidelines do not affect earnings management, because compliance with regulations is carried out only because it is mandatory, not yet fully determined. Then, the existence of authority as a company owner and operational manager, will make managers more flexible in managing earnings because they have information that is not owned by external investors.

The advice contributed in this research is that there is a need for cooperation and synergy from various business actors, regulators, accountants, board of commissioners, etc. to provide socialization of benefits, and the importance of corporate governance so that ethical awareness arises about the importance of good corporate governance practices for improving business performance and sustainability in Indonesia, which will reduce negative earnings management practices.

For regulators and governments, it must strengthen the rules in the form of guidelines for implementing aspects of corporate governance to match those applied at the international level, so that users of financial statements have a balanced level of perspective and assessment.

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Information Technology Freshmen' Attitudes towards English Language Learning with Blended Learning Course at FPT Polytechnic College

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Abstract— Driven by evidence of its advantages over either online or classroom teaching alone, blended learning has increased rapidly in many educational contexts around the world, including Vietnam. With the holistic purpose of improving the language teaching and learning quality for polytechnic students, the paper focused on the students' attitudes towards the current English blended learning course. The survey study was conducted at FPT Polytechnic College (Ho Chi Minh City, Vietnam) with the participation of 139 Information Technology freshmen. The data were garnered through the 45-item-questionnaire, and were statistically analyzed by SPSS version 20.0. The findings show that the majority of the students exhibited their much positive attitudes towards four aspects: the overall quality of this course, the quality of the instructors, the course content, and the supportive services. Yet, some students were dissatisfied with the other aspect—technology system— as they often faced technological problems during online learning outside the class.
Index Terms— Information Technology, Freshmen, Attitudes, Blended Learning Program, FPT Polytechnic College

INTRODUCTION

With development in information technology, educators need to find appropriate teaching methods to meet the current educational situations, especially in language teaching contexts. Therefore, online learning teaching environments have rapidly developed worldwide. However, online learning environments lack benefits that face-to-face learning environment have as Sikora and Carroll (2002) state that when compared with face-to-face learning environments, students who are learning online tend to be less satisfied with totally online courses. Hence, this leads to the notion of blended learning.

The concept of blending various teaching methods to obtain an effective learning outcome has become a subject of past and present exploration by academic researchers. Ayala (2009) describes that blended learning is the purposeful integration of face-to-face and online learning. Blended learning is confronted to maximize advantages of traditional and online learning. In blended learning environment, learners are capable of accessing learning materials by using web technologies outside classroom while attending traditional education (Graham, Allen, & Ure, 2003). Furthermore, online learning gives times and location flexibly while traditional learning provides further social interaction, which is not possible within online learning environment. In this way,

advantageous aspects of face-to-face and online learning complete each other.

In addition, blended learning allows students and teachers to break free of the isolation of the classroom. William (2002) indicates that with a mixture of the different pedagogical methods and teaching strategies, lectures are not centered; whereas, teaching comprises more interaction, group work, case studies, presentations, simulations and other types of learning activities. Therefore, most current studies have been conducted and from their results, the researchers have encouraged faculties and learners to use blended courses. Garrison and Vaughan (2008) reported that blended learning furnishes a vision and roadmap for high education faculty to recognize the possibilities of blending traditional and online learning for engagement and meaningful learning experiences. Based on previous studies, it is considered as a good choice for students and faculty. Thus, many colleges and universities have applied this mode in language teaching and in other subject training (Sloan, 2008; Duckworth, 2010).

The blended learning mode has been implemented in FPT Polytechnic in Ho Chi Minh City since 2011 as it is viewed as a better approach to enhance learners' language competence. The FPT Polytechnic administrators have chosen this mode to teach English language for students since they desire all students be able to apply the studied knowledge to produce language; a dynamic educational environment or student-centered learning instead of teacher-centered learning. And passive learners become more active in their learning. In general, many learners are able to use English to communicate in their classes since they have learnt online new words and structures outside class. With this approach, students have to learn online with lessons designed intensively with videos, and pictures via the LMS channel (Learning Management System). They have opportunities to interact with each other and be flexible in language learning (Sloan, 2008). When entering their class, their teacher provides activities to push students produce the target language as well as create a dynamic language learning environment to create learners' interests, and check whether they have learnt lesson online or not instead of teaching lesson again in class. He/she plays an important role to support and facilitate learners learning English language, and make the blended learning environment successful. Chew (2011) describes that the blended learning

might enhance through increasing learners' self-motivation and developing instructors' professional. However, blended learning is a new model. It causes a challenging for teachers and learners (So & Bonk, 2010). Similarly, Garrison and Vaughan (2008) also found that beside assumption of its benefits, blended learning brings significant difficulties and risks for faculties and students related to technology uses in learning and teaching, insufficient support, and lack of time and resources for course development. Other academics faced difficulties in finding the most effective ways to enact blended learning solutions. For instance, Lionarakis and Paradimitrou (2003) found the time and complexity of designing and developing a blended program was vital challenges in the

implementation of blended learning. And, they also considered that technologies, instructors, and technological support were factors that affected to blended effectiveness. Although there were many researches about blended learning, few of them focused on students' attitudes towards this mode. So, it is necessary to examine this construct.

The aim of the current paper was to investigate the freshmen's attitudes towards learning language with the aid of blended learning at FPT Polytechnic College, Vietnam. This paper, accordingly, formulated the following question: *What are the Information Technology freshmen' attitudes towards English blended learning course at FPT Polytechnic College?*

METHOD

A. Research Site and Participants

This study was conducted in the Fall semester of 2019-2020 at the faculty of Information Technology of FPT Polytechnic College in Ho Chi Minh City, Vietnam. It is a practical college of FPT University, which was established in July 2010, employing a project-based training method and blended learning mode to help students learn by working on realistic projects and gain outcome. Regarding to the Faculty of Information Technology, there were four departments including Web Design, Software Application, Computer Program, and Graphic Design that the faculty was responsible

for management. In the Fall semester of 2019-2020, there were 20 English classes of Information Technology with nearly 800 students including four levels (i.e. 1A, 1B, 2A and 2B) in which those who studied General English at level 1B were 139 and were divided in 5 classes. These 139 1B-level students became the target sample of this study, three-quarters of whom were males, and four-fifths of whom aged from 18 to 20.

B. Description of the English Blended Learning Program at FPT Polytechnic College

TABLE 1. DESCRIPTION OF THE BLENDED LEARNING PROGRAM AT FPT POLYTECHNIC COLLEGE

Components	Description
Material	<i>Topnotch 1</i> (2nd edition) published by Longman Pearson with 10 units. The students at level 1B would learn 5 units from U6-U10 based on the syllabus lasting 10 weeks (4 hours per week) in face-to-face learning.
Blended learning process	The students learnt English lessons online at home before entering the class, while the instructor was responsible for creating a dynamic environment of discussion with them based on course materials. In this way, the students could join activities and discuss issues they had not been understood with their classmates and instructor when they were in class. The instructor also examined what the students had learnt at home and had them practice it when they were in the classroom.
Online learning environment	In order to help the students to learn lessons online, a supportive tool adopted is the Learning Management System (LMS) which used a web-based server software platform. It helped the students in learning online, downloading resources and submitting assignments. In the level 1B, the students had to practice language skills (listening, reading, and writing) and language knowledge (pronunciation, grammar, and vocabulary) for each unit.
Learning assessment	The students' learning results were assessed through three factors: class attendance, learning process, and topic assignment. 1. In terms of class attendance, the students present in class 20 sessions equivalent to 40 hours (2 hours per session) during the English course. If their absence was over 04 sessions (over 25% of class time), they were skipped class. 2. In terms of learning process, students were evaluated based on sub factors as follows: <ul style="list-style-type: none"> ▪ Online learning (10%, equivalent to 1.0 point): The students must learn online lessons and accumulate points over 0.75. If their point accumulation was under 0.75, they could not protect their final topic assignment. ▪ In-class participation (10%, equivalent to 1.0 point). ▪ Progress tests (20%, equivalent to 2.0 points): The students must complete two progress tests during the courses. 3. In terms of topic assignment for presentation at the end of the course, the students chose one of five topics in the first day of the school and did it through four stages. <ul style="list-style-type: none"> ▪ Assessment of the first stage (10%, equivalent to 1.0 point). ▪ Assessment of the second stage (10%, equivalent to 1.0 point). ▪ Assessment of the final document (10%, equivalent to 1.0 point). ▪ Presentation for the document (30%, equivalent to 3.0 point).
Teaching assessment	Assessment for the blended course and the instructors was from students. The FPT Polytechnic gathered student feedback data through online survey involving five criteria: 1) <i>Faculty's punctuality</i> ; 2) <i>Communication skills</i> ; 3) <i>Subject coverage</i> ; 4) <i>Support</i> ; 5) <i>Faculty's response</i> . The students would give feedback through 4 scales from strong dissatisfaction to strong satisfaction, and they could express opinion relating to instructions at the Comment column. If grade point average (GPA) of each instructor was over 3.4, no troubles were found in teaching.

C. Questionnaire: Rationale, Description, Collection and Analysis

The researchers decided to utilize a questionnaire which is known to be one of the easiest methods to manage, even with a large number of subjects (Dörnyei, 2010) and one of the most useful tools to exploit the subjects' attitudes, beliefs and perceptions (Koshy, 2005). The 45-item questionnaire

consisted of five distinct sections. The first section was associated with the participants' overall attitudes towards the blended learning course (Items 1-16), followed by the second section which addressed the sample's attitudes towards the quality of instructors participating on blended learning course (Items 17-27), and the third section which focused on the participants' attitudes towards technology system and interface design (Items 28-35). The fourth section was

pertinent to the respondents' attitudes towards course information or content used in blended learning (Items 36-42), followed by the last section which assessed the students' attitudes towards assistance of staff or administrators relating to the blended course (Items 43-45). These items were rated on a five-point Likert-scale, including 1=*totally disagree*, 2=*disagree*, 3=*uncertain*, 4=*agree*, and 5=*totally agree*. The questionnaire scale was reliable as proven by its internal consistency indexes. More specifically, the Cronbach's Alpha values of all five sub-scales were greater than .700 (Pallant, 2005). Besides, such high reliability of the questionnaire

stemmed from the fact that the researchers adapted from different resources such as Garrison and Vaughn (2008), Ozkan and Koseler (2009), and Larsen (2012).

On the chosen dates, the questionnaire copies which had been translated into Vietnamese beforehand were delivered to 540 participants. On the receipt of questionnaires from the respondents, the researchers found that all 540 copies (100%) were valid and accepted. Finally, the researchers employed Statistical Package for the Social Sciences (SPSS) version 20.0 to analyze the descriptive statistics of the collected questionnaires in terms of percentage (%).

RESULTS

D. Overall Attitudes towards the Blended Learning Course

TABLE 2. OVERALL ATTITUDES TOWARDS THE BLENDED LEARNING COURSE

Item	Statement	SD*	D*	U*	A*	SA*
1	I am more likely to ask questions in a blended course.	2.9%	7.2%	18.0%	23.7%	48.2%
2	Generally, I am more engaged in my blended courses.	0.7%	9.4%	12.2%	32.4%	45.3%
3	I am motivated to succeed.	1.4 %	8.6%	11.5%	28.1%	50.4%
4	I access the course content whenever I need.	0.7%	6.5%	20.9%	56.1%	15.8%
5	Given the opportunity I would take another blended course in the future.	2.9%	5.0%	7.9%	30.2%	54.0%
6	There are more opportunities to interact with others in a blended course.	5.0%	15.1%	13.7%	36.0%	30.2%
7	My blended course experience increases my opportunity to access, use information.	1.4 %	8.6%	11.5%	28.1%	50.4%
8	Blended learning helps me better understand course material.	0.7%	5.0%	20.9%	54.7%	18.7%
9	Generally, I understand course requirements better in an blended course.	1.4%	6.5%	12.9%	29.5%	49.6%
10	Blended learning improves my vocabulary.	1.4%	9.4%	12.2%	27.3%	49.6%
11	Blended learning improves my grammar structures.	5.0%	15.1%	13.7%	36.0%	30.2%
12	Blended learning improves my pronunciation.	1.4%	4.3%	15.8%	33.1%	45.3%
13	Blended learning enhances my reading skill.	0.7%	5.8%	13.7%	33.8%	46.0%
14	Blended learning enhances my speaking skill.	0.0%	5.8%	10.1%	40.3%	43.9%
15	Blended learning enhances my listening skill.	0.7%	8.6%	9.4%	28.8%	52.5%
16	Blended learning enhances my writing skill.	0.7%	7.2%	15.1%	54.0%	23.0%

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

As shown in Table 2, the majority of the students showed their positive affection on the overall blended learning course; for example, nearly four-fifths of the participants (50.4% strongly agree, 28.1% agree) were motivated to succeed (Item 3), and more than three-quarters of them (45.3% strongly agree, 32.4% agree) were more engaged in the blended course because they had opportunities to gain knowledge due to online learning before going to school (Item 2). Besides, nearly three-quarters of the participants (48.2% strongly agree, 23.7% agree) were more likely to ask questions during the course to construct their knowledge because of learning beforehand (Item 1). In addition, the respondents' behavioral attitudes of the students towards the overall blended learning were proven positive. In specific, 84.2% (54.0% strongly agree, 30.2% agree) united that they desired to take another blended course in the future (Item 4); and, 71.9% (15.8% strongly agree, 56.1% agree) of the students disclosed that they accessed the course content whenever they needed to (Item 5). Moreover, the majority of the respondents also expressed their cognitive attitudes towards the overall quality of the blended learning. First of all, nearly two-thirds of the sample (50.4% strongly agree, 28.1% agree) believed that there were more opportunities to interact with others in the

blended course (Item 6). Secondly, just about four-fifths of the response community (50.4% strongly agree, 28.1% agree) considered that their blended course experience increased their opportunity to access and use information (Item 7). Thirdly, approximately three-quarters of the informants (18.7% strongly agree, 54.7% agree) asserted that the blended learning helped them better understand course material (Item 8). Fourthly, nearly four-fifths of the respondents (49.6% strongly agree, 29.5% agree) asserted that they understood the course requirements better in the blended course in general (Item 9). Fifthly, the majority of the total sample approved that the blended learning course enhanced their English language knowledge: vocabulary (Item 10, 49.6% strongly agree, 27.3% agree), grammar (Item 11, 30.2% strongly agree, 36.0% agree), and pronunciation (Item 12, 45.3% strongly agree, 33.1% agree). Sixthly, the big proportion of the target sample also recognized the contribution of the blended learning course to their development of language skills: reading (Item 13, 46.0% strongly agree, 33.8% agree), speaking (Item 14, 43.9% strongly agree, 40.3% agree), listening (Item 15, 52.5% strongly agree, 28.8% agree), and writing (Item 16, 23.0% strongly agree, 54.0% agree).

E. Attitudes towards the Quality of Instructors Participating on Blended Learning Course

TABLE 3. ATTITUDES TOWARDS THE QUALITY OF INSTRUCTORS PARTICIPATING ON BLENDED LEARNING COURSE

Item	Statement	SD*	D*	U*	A*	SA*
17	The instructor helps to keep students engaged in productive discussion.	2.2%	2.9%	10.8%	21.6%	62.6%
18	The instructor helps keep students on tasks in a way that helped me to learn.	2.2%	2.9%	10.8%	21.6%	62.6%
19	The instructor encourages students to explore new concepts in the course.	2.2%	2.9%	10.8%	21.6%	62.6%
20	The instructor helps to focus discussion on relevant issues to facilitate my learning.	2.2%	2.9%	10.8%	21.6%	62.6%
21	The instructor communicates important course topics.	2.2%	6.5%	8.6%	21.6%	61.2%
22	The instructor communicates expected learning outcomes.	2.9%	4.3%	11.5%	53.2%	28.1%
23	The instructor provides clear instructions on how to participate in the activities.	2.2%	6.5%	18.0%	18.7%	54.7%
24	The instructor clearly communicates important due time frame for the activities.	6.5%	20.1%	18.7%	25.2%	29.5%
25	The instructor is helpful in guiding the class towards understanding course topics.	2.2%	2.9%	11.5%	55.4%	28.1%
26	The instructor provides feedback to help me understand my strengths, weaknesses about the course objectives.	2.2%	5.8%	11.5%	51.8%	28.8%
27	The instructor provides feedback in a timely fashion.	5.0%	19.4%	15.1%	25.2%	35.3%

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

As Table 3 illustrates, the good quality of the instructors participating in the blended learning course was acknowledged by a large number of the students. Overall, more than four-fifths of the informants (62.6% strongly agree, 21.6% agree) were engaged in productive discussion thanks to the instructor's supports (Item 17). Based on the consensus of many students, the instructor helped keep them on tasks (Item 18, 62.6% strongly agree, 21.6% agree), encouraged them to explore new concepts in the course (Item 19, 62.6% strongly agree, 21.6% agree), and helped to focus discussion on relevant issues to facilitate my learning (Item 20, 62.6% strongly agree, 21.6% agree). What's more, the majority of the participants also were satisfied with their instructors because these instructors communicated important course topics (Item 21, 61.2% strongly agree, 21.6% agree), communicated target

learning outcomes (Item 22, 28.1% strongly agree, 53.2% agree) in the first days of the course, and communicated due time frame for the activities during the lessons (Item 24, 29.5% strongly agree, 25.2% agree). Likewise, the instructors also facilitated the students' language learning by providing instructions on how to participate in the activities (Item 23, 54.7% strongly agree, 18.7% agree) and by guiding the class towards understanding course topics (Item 25, 28.1% strongly agree, 55.4% agree). Besides, many students also recognized that their instructors provided feedback in a timely fashion (Item 26, 28.8% strongly agree, 51.8% agree) to help them understand their strengths and weaknesses about the course objectives (Item 27, 35.3% strongly agree, 25.2% agree).

F. Attitudes towards Technology System and Interface Design

TABLE 4. ATTITUDES TOWARDS TECHNOLOGY SYSTEM AND INTERFACE DESIGN

Item	Statement	SD*	D*	U*	A*	SA*
28	I can find required information easily on LMS.	0.7%	7.2%	17.3%	55.4%	19.4%
29	I am interested in learning on LMS.	2.9%	7.9%	24.5%	42.4%	22.3%
30	I access LMS every day to study lessons.	6.5%	18.7%	29.5%	27.3%	18.0%
31	LMS is a very efficient educational tool.	2.2%	5.8%	16.5%	41.0%	34.5%
32	I have not faced any system errors on LMS.	5.0%	17.3%	25.2%	38.1%	14.4%
33	LMS is easily accessible via Internet.	6.5%	21.6%	25.9%	37.4%	8.6%
34	LMS's graphical user interface is suitable for blended learning systems.	2.2%	7.2%	25.2%	39.6%	25.9%
35	LMS improves my learning.	1.4%	3.6%	18.7%	48.9%	27.3%

(*): SD: Strongly disagree; D: Disagree; U: Uncertain; A: Agree; SA: Strongly agree

As can be seen from Table 4, the participants showed their both their positive and negative attitudes about the LMS (Learning Management System) tool. To the former, nearly three-quarters of the students (19.4% strongly agree, 55.4% agree) opined that they found required information easily on LMS such as course material and assignment (Item 28); roughly two-thirds of the respondents (22.3% strongly agree, 42.4% agree) were interested in learning on LMS (Item 29); about three-quarters of the participants (34.5% strongly agree, 41.0% agree) reckoned that LMS was a very efficient educational tool (Item 31); under two-thirds of the respondents (25.9% strongly agree, 39.6% agree) applauded that LMS's graphical user interface was suitable for blended learning

systems (Item 34); and, more than three-quarters of the response community (27.3% strongly agree, 48.9% agree) stated that LMS improved their language learning (Item 35). To the latter, only 45.3% of the students (18.0% strongly agree, 27.3% agree) unraveled that they accessed LMS every day to study lessons (Item 30); half of the sample encountered various problems while learning like system errors (Item 32, 14.4% strongly agree, 38.1% agree) and accessibility via the Internet (Item 33, 8.6% strongly agree, 37.4% agree).

G. Attitudes towards Course Information or Content Used in Blended Learning

TABLE 5. ATTITUDES TOWARDS COURSE INFORMATION OR CONTENT USED IN BLENDED LEARNING

Item	Statement	SD*	D*	U*	A*	SA*
36	The course content is interesting.	0.7%	3.6%	7.2%	20.9%	67.6%
37	The presentation is interesting.	0.7%	2.2%	7.9%	23.7%	65.5%

38	My college provides resources necessary for me to succeed in the blended course.	0.0%	5.0%	5.8%	61.2%	28.1%
39	Compared to English 1A, the workload in this course was moderate.	0.7%	8.6%	5.0%	19.4%	66.2%
40	The content is up-to-date.	2.2%	7.2%	12.2%	25.9%	52.5%
41	I find it easy to understand and follow the content in lecture.	2.2%	12.2%	7.9%	13.7%	64.0%
42	Abstract concepts (principles, formulas, rules) are illustrated by concrete examples.	0.7%	0.0%	5.8%	23.7%	69.8%

(*): **SD**: Strongly disagree; **D**: Disagree; **U**: Uncertain; **A**: Agree; **SA**: Strongly agree

As Table 5 depicts, affectively, nearly ninety-percent of the students affectively approved that the course content (Item 36) and the instructor’s presentation (Item 37) were interesting, holding 88.5% (67.6% strongly agree, 20.9% agree) and 89.2% (65.5% strongly agree, 23.7% agree), respectively. Moreover, most of the student informants showed their positive cognitive appraisals of the content of the English blended learning course. Statistically, 89.3% of them (28.1% strongly agree, 61.2% agree) admitted that their college provided resources necessary for them to succeed in the blended course (Item 38); 85.6% of the sample (66.2%

strongly agree, 19.4% agree) considered that the workload in 1B level course was moderate like 1A level (Item 39); 78.4% of the target response community (52.5% strongly agree, 25.9% agree) asserted that the content is up-to-date (Item 40); 77.7% of the recruited members (64.0% strongly agree, 13.7% agree) acquiesced that they found it easy to understand and follow the content in lecture (Item 41); and, 93.5% of the students (69.8% strongly agree, 23.7% agree) contended that abstract concepts (e.g. principles, formulas, rules) were illustrated by concrete, specific examples (Item 42).

H. Attitudes towards Assistance of Staff or Administrators relating to the Blended Course

TABLE 6. ATTITUDES TOWARDS ASSISTANCE OF STAFF OR ADMINISTRATORS RELATING TO THE BLENDED COURSE

Item	Statement	SD*	D*	U*	A*	SA*
43	I get the technical support I need during this course.	1.4%	5.0%	25.2%	43.2%	25.2%
44	The service supported by the university is good enough.	0.7%	5.8%	17.3%	56.8%	19.4%
45	When I counter an error in the system, I can get immediate feedback by e-mail and telephone.	1.4%	2.9%	18.7%	56.1%	20.9%

(*): **SD**: Strongly disagree; **D**: Disagree; **U**: Uncertain; **A**: Agree; **SA**: Strongly agree

As Table 4.6 displays, the large quantity of the students exhibited their positive attitudes towards assistance of staff or administrator when they participated in the blended learning course. In details, more than three-quarters of the students (20.9% strongly agree, 56.1% agree) could get immediate feedback by email and telephone (Item 45); similarly, roughly

three-quarters of the informants (19.4% strongly agree, 56.8% agree) confessed that service supported by this college was good enough (Item 44). Furthermore, more than two-thirds of the sample (25.2% strongly agree, 43.2% agree) admitted that they received the technical support they need to (Item 43).

CONCLUSION

In conclusion, the questionnaire results obtained from the sample of 139 Information Technology students at 1B level indicated that the majority of them showed their positive attitudes towards and preference on the English blended learning course offered by the FPT Polytechnic College of Vietnam. Based on their evaluative responses, most of them strongly favored the blended learning course in overall, highly approved of the quality of instructors participating on blended learning course, strongly applauded the course information or the content used in blended learning, and were highly valued the assistance of staff or administrators during the English blended learning course. Undoubtedly, this innovative mode brought several benefits to the college students, involving enhancing their autonomy and motivation degree, and nourishing their language knowledge and language skills. The students could reflect what they had learnt with self-space outside the class, and become self-confident to interact with others inside the class. Until their autonomy and motivation developed, language knowledge and skills, along with communicative competence were significantly improved. Yet, the questionnaire results also illustrate that one of five factors that made the students dissatisfied most is the technical system served in online learning. The surveyed students’ positive attitudes diminished when the online learning process was

often interrupted, and the system occurred many errors. For example, the students could not log into the LMS system when necessary, and could not move an item into its right location. Henceforth, the teachers, the institutional administrators, and technical assistants need to consider this problem carefully to maximize the students’ learning outcomes and motivation.

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Current Status of Municipal Solid Waste Management in Juba City, South Sudan

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Abstract- Juba City, South Sudan, like any other developing countries in the world, has a problem of collecting solid waste. That is: one-third to two-thirds of the solid waste generated is not collected, therefore municipal solid waste management (MSWM) has become a complex developmental issue in Juba, the Republic of South Sudan due the economic activities. South Sudan is a developing country that just recovered from the decades' conflict situation from the North Sudan and experiencing alarming solid waste problems in the capital. The aim of this review paper is to assess the current status of MSWM in Juba city, in order to point out the current challenges and thereafter suggest some possible MSWM measures as solutions to the problems. Solid waste has been found not only to affect the environment and public health but it is noted to hinder efforts by several Governments especially in developing countries like South Sudan in the management of the environment, population growth, increased urbanization and more demand for goods and services have caused the persistent rise in the volumes of solid wastes generation in the developing countries. This has posed threats to the environment and socio-economic keys. It is challenging that the management of solid waste is rapidly becoming difficult as the dumping of uncollected wastes are found along the major roadside of Juba city. Therefore, Juba city faces serious environmental challenges concerning solid waste management due to rapid urban development and population increase. Open dumps have environmental safeguards; they can pose major public health threats and environmental effects in urban cities like Juba currently. However, the solution chosen for SWM in the development plan is the establishment of landfills on the outskirts of the city with recycling to reduce space for waste disposal. However, the problem of waste management is now beyond the capacity of Juba city Council due to abrupt population explosion and its related waste production, which requires significant resources of waste management, which are unavailable.

Index Terms- Solid waste management, Municipal solid waste, current status, Payams, Urbanization, Juba city council.

1. INTRODUCTION

Solid waste management has become a major challenging issue currently in Juba, South Sudan and facing almost all the developed

and the developing countries across the world (Gabriel 2015). The waste can also be called as any such material which must be disposed of and have no immediate economic demand after its usage. Generally, it is classified into three groups i.e. Liquid Waste, Gaseous Waste and Solid Waste. The solid waste consists of the material disposed of or thrown away as trash, garbage and rubbish from the homes or from any institution (Omofonmwan SI 2009). The management of waste should focus on how to find the value and redirect it back to the community. But unfortunately, our collecting and dumping process mix and crush everything together; and make separation an expensive and sometimes impossible task to properly manage wastes (Rabie 2006). The proper management of solid wastes generated from individual house, institutions such as hospitals, health centers; from public eating and drinking establishments (hotels, restaurants etc.); from business and working places is a very important part of environmental health service in a community. However, if these wastes are not disposed in a proper way, they create breeding places for insects such as flies, mosquitoes etc.; they provide food and harborages for rats. These insects and rats are health risk in that they are potential disease transmitters. In addition to health problems rats also imposes an economic problem (Sisay 2007). Several studies indicate that most of the solid waste is generated from the households (55% - 80%), market areas (10% - 30%), and institutions among others from the developing and developed countries. (Nagabooshnam 2011). Research has further indicated that wastes from these sources are highly heterogeneous in nature and have variable physical characteristics depending on their sources (Valkenburg 2008). Despite the present concern of governments, organizations and individuals about solid waste management in South Sudan and in Africa, it is still faced with more serious solid waste management problems with its associated negative health and environmental consequences. Therefore, the importance of a waste management system must always be the delivery of a discharging service which helps to maintain the safety and health of citizens and their environment (Cooper 1999).

Juba the capital city of the world's youngest Nations is very poor in term of solid waste management (Programme. 2007). South Sudan, a newly emerging and developing country, gained its independent from Sudan on 9th July 2011 after decades of civil war. South Sudan is surrounded by Ethiopia and Republic of Kenya in the East, Republic of Uganda and Congo (DRC) in the South, Central Africa Republic in the West and Sudan in the North. The

Republic of South Sudan is divided into several levels of government; the national government, the states, counties, payams and Bomas and municipalities in prominent cities. The Armed conflict broke out again in 2016, reversing much of the development progress including the waste management plans with the capital achieved by this new nation. The lack of infrastructure, low-level education for public awareness on the impact of waste on the health of the citizens and insecurity due to conflicts to access the landfill, contribute to the challenges of the local economy. The city Juba turned to commercial center right after the signing of Comprehensive Peace Agreement (CPA) in 2005. According to the report made by the United Nation (UN) estimates that the population living in Juba have reached over 1.5 million people because majority of people are foreigners who came to operate their businesses and more other local citizens left their own states, counties, payams to Juba to search for jobs and safety during the difficult times of the internal conflicts (Gabriel 2015).

However, the same situation relate to most of the South Asian cities facing the similar problems like urbanization, rural urban migration and the developments of industrialization and waste management technologies. As a result of all this population of cities' rapid increase. The constant increase in population has resulted in the generation of solid waste which is serious threat not only to the inhabitants of the areas but it is also a cause of environmental degradation, due to the poor management of solid waste, these cities are facing problems relating to public health and environmental pollution. Poor waste management is the result of poor Government Policies, lack of political will, lack of appropriate use of economic and human resources, and weak local institutions result in poor waste management especially in larger cities of developing countries. The local municipalities are trying their role to manage the solid waste but their hard work result into nothing due to the lack of resources, financial support, institutional and infrastructure facilities (Visvanathan C 2006). The conditions of waste management in the city of Juba South Sudan is worsening, well above the curve of these worrying global trends. Juba's population is continuing to grow rapidly – largely as a result of search for jobs as Juba is the headquarter of all the big organizations and in the past few years when there was insecurity in some counties due the civil war caused migration of many people for safety.

1.1. Overview on solid waste management

According to the UN estimates that in 2025, the world population will be 8 billion inhabitants, and around 2050, the total population will be around 9.5 billion, 50% more than the current one. 97% of this growth will be realized in Asia and Africa. The rising middle class in developing countries will shape both the economic and the political landscape. Nowadays, the total amount of waste generated per annum worldwide includes (municipal, industrial, hazardous) is more than 4 billion tons (Veolia 2009). Almost 45% of it is considered as municipal solid waste, while the rest is industrial waste, including hazardous ones. In addition, it has been estimated by UN that globally, urban household waste is going to increase by 44% from 2005 to 2025. As a global amount of the expected impacts, if present waste management trends are maintained, land filled food waste is predicted to increase the landfill share of global anthropogenic emissions from 8 to 10% (Adhikari 2006).

Recycling is one of the most important sectors in terms of employment creation and currently employs 12 million people in just three countries - Brazil, China and the United States. Generally, counting the casual sector, the number of individuals working in reusing is assessed to be more than 20 million people (Medina 2008). Waste management industry is one of the most dynamic ones on a global scale, with an annual revenue above 430 billion \$ and around 40 million workers (including informal recyclers), the industry covers a huge variety of operations for different waste streams and different phases of the waste life cycle. It is considered that the industry will further grow, especially in developing countries, and recycling business will be the foundation of it. Per capita waste generation increases with both the development level and the income level of the country (Wilson 2012).

1.2. Sources of solid wastes and types

Municipal solid define waste as a general term, which involves all waste materials except hazardous waste, liquid waste and atmospheric emissions. Solid waste can be further subdivided into two common categories: private and commercial waste. The private category refers to the waste that's assigned as 'garbage'. The trash class can be depicted as the waste that's assembled by the community administrations. The commercial category contains industrial and agricultural customers. Badran, M. (Badran 2006) observed in the study that sought to characterize the amount and composition of solid waste in Vietnam that total wastes, food wastes and plastic wastes were the major types of wastes generated. This waste generation had a significant seasonal variation. also observed in a study on solid waste generation and composition in Gaborone, Botswana, noted that close to 45,000 tons of the annual amount of solid waste to landfill were paper, garden and wood waste, textile, food, metals, glass, electronic waste, plastics and fines (Nagabooshnam 2011).

Zurbrugg and Nze noted that family wastes are regularly produced from a few sources where variable human exercises are experienced. They argued that most solid waste from developing nations are produced from families (55–80%), taken after by commercial or market zones (10–30%) with changing amounts from roads, businesses, institutions among others.

1.3. Practices on solid waste management in the world

Currently, most countries especially the third world countries, solid waste management is one of the major challenging to the municipal authorities (Xiang 2019). The rapid and constant growth in urban population led to a dramatic increase in solid waste generations, with an important socioeconomic and environmental impact (Sharholy 2018). The significant effects are street littering, blockage drains and causing flooding, transmitting diseases through breeding from burning of waste, harming animals that unknowingly consume waste, hindering tourism's sector contributions to nation's collected socio-economic development. Furthermore, due to improper waste management system practice the organic contents of waste contaminates the soil and human health including animals' life are risk. Municipal solid waste which usually comprises of household waste, yards waste, packaging waste, including commercial and institutional waste is expected to double in next decade (European Parliament and Council, 2008), Waste management in the developing and

developed countries varies. For example, in Asia, a developing continent, most countries face severe problems in managing urban solid wastes. It is evaluated that Asia produces 0.5 million tons of wastes per day and cities and towns in Sri-Lanka produces nearly 3000 tons/day, with an yearly increment of 5%. Dumping of wastes on authorized as well as unauthorized sites is the common practice causing health problems to humans and misbalancing the ecosystems. However, European countries, North America and other developed countries have techniques for reducing the quantities of domestic waste and eventual disposal in landfills (AESSL. 2007). Municipal managers in the developed countries are looking to the development of sanitary landfills around the outside of their cities as a first solution. Landfills however, require the acquisition of large areas as well as good day-to-day operation in order to minimize potential negative environmental impacts. The other option is mass burn incineration similar to systems found in OECD countries (Rand 2000). In the developing world, poor management, outdated collection and transportation methods, scavenging and a shortage of proper disposal sites, complicates waste management services. The uncollected waste creates problems at the community level- blockage drains, releasing vulgar odors and toxic gases, and spreading diseases (Sersgeldin 1994).

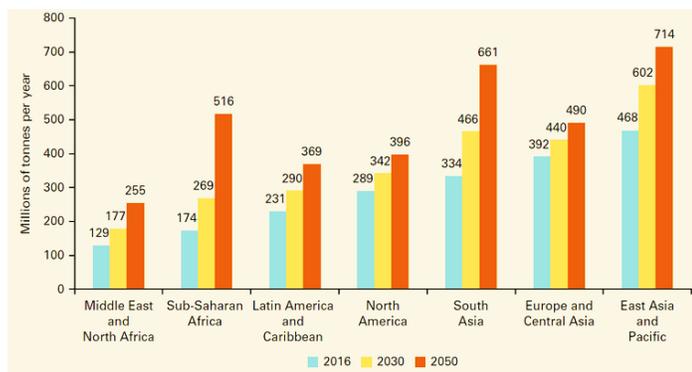


Fig 1. Global waste generation in developed and developing countries. Source, on internet.

A study conducted in Ghana shows high rate of urbanization in African countries indicates a rapid accumulation of solid waste. Social and economic development that most African countries have witnessed since the 1960s have also contributed to an increase in the waste generations per capita (Owusu 2012). It was observed that in South Sudan and Zambia as an example, there was no separation of the various types of solid waste, the waste components are just mixed and dumped in areas that are not designated for waste disposal (Yamba 2004). The best way of managing solid wastes is the internalization of costs (by levying charges for the use of the services). This is especially beneficial when a command and control policy is not effective. Government intervention is necessary for this. However, the major problem for solid waste management is the internalization of costs of waste disposal from households (Monyoncho 2013). According to Lusaka city council (2004) solid waste management is the responsibility of Lusaka city council (LCC) waste management unit, similarly to Juba, the waste management is in the responsibilities of Juba city council. The waste management unit (WMU) has partnered with Community Based Enterprises (CBES) and were responsible for the day-to-day management of the waste system in peri-urban areas. Based on Monyoncho, G. O noted that

there is need of adequate reserves to fund awareness campaigns to empower waste minimization at source together with minimal workforce hinder municipalities' endeavors to attain their vision (Monyoncho 2013). Moreover, the study done in Khulna, Bangladesh local governments are responsible for the collection and disposal of the wastes generated within their jurisdiction, as well as for the operation and maintenance of their equipment. In any case, local governments usually need the specialist and assets to supply a satisfactory and financially practical benefit. Effective and efficient solid waste management depends upon a fair distribution of responsibilities, authority, and revenue between the national government and all the local governments (JOHN April, 2017).

2. Background information of Juba city, South Sudan

Juba is the capital city of the Republic of South Sudan is selected for the present study which is the seat of the government of Central Equatoria state, headquarters of Juba County and where Juba City Council or Municipality lies. Juba city is found on scope 4°51'N and longitude 31°36'E and 518 meters over sea level. Juba city lies on the western bank of the White Nile. The city council or municipality comprises of three Payams (Districts) namely; Juba Payam, Munuki Payam and Kator Payam.

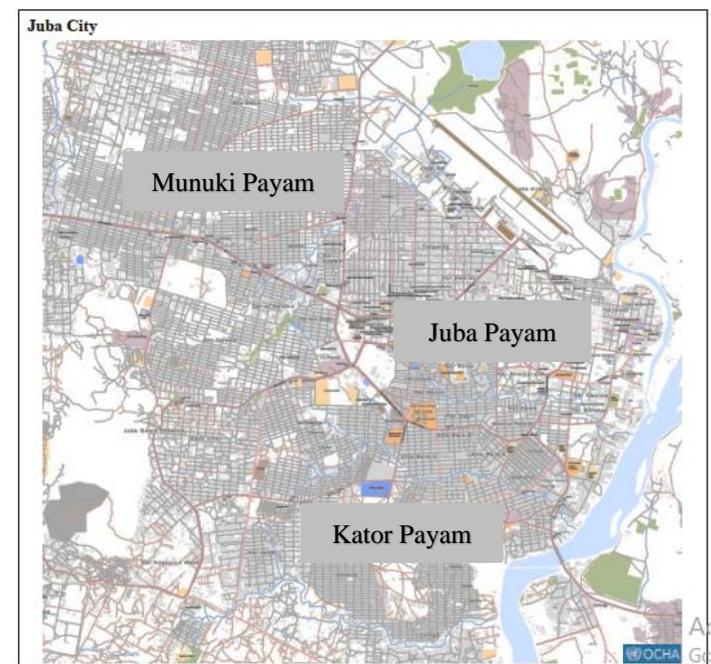


Fig 2. The study targeted the three Payams of Juba city.

The climate of South Sudan is tropical in nature and is characterized by a rainy season followed by a dry period. May is the wettest month with marginally lower temperatures, higher humidity and more noteworthy cloud scope. Normal temperatures for South Sudan run between 20 to 30°C in July and 23 to 37°C in March (weather-and-climate.com) Due to many years of civil war (1955-1972 and 1983-2005) in South Sudan (the then Southern Sudan), basic sanitation infrastructure for solid waste management was not given importance as a result, Juba city is lacking facilities to manage solid waste. Due to need of rubbish collection administrations, most individuals utilize roadsides, open spaces, football areas, waterway banks, waste channels and indeed graveyards as dumping destinations. A few

wastes are burned in residential regions, on the roads, etc. leading to air pollution with likely potential health hazards. The circumstance was made worse by the return of displaced people from the neighboring nations and IDPs from Sudan as well as from Ethiopia, Kenya and Uganda when the country got independence in 2011 that brought relative peace and financial boom within the nation.



Fig 3. Map of South Sudan showing location of case study Juba city.

Trash is collected in parts of Juba at a charges but the service is unpredictable with 95% of Juba's home have no access to the waste collection benefit. Cholera and other waterborne diseases are common in Juba and South Sudan at large with major cholera outbreaks in 2006, 2007, 2008 and 2014 and the latest in 2015, with over 1,597 cases including more than 45 death.

2.1. Summary of MSWM practice in Juba city

The increase in the rate of MSW generation in African countries like South Sudan has been worsened by an increase in urbanization, rapid population growth, rural-urban migration and industrial growth. MSWM in Juba is based on waste collection, transportation and disposal at a dumping site originally in line with the South Sudan Development Plan (Rehabilitation 2012). The solution prefer for SWM in the development plan is the improvement of landfills on the outskirts of Juba city with recycling to reduce space for waste disposal. However, the problem of waste management is now beyond the capacity of Juba City Council due to abrupt population explosion and its related waste production which requires significant resources of waste management which are unavailable (Rehabilitation 2012).

However, a solid waste dumping site was identified in 2007, located at Rejaf Payam of the Juba-Yei road about 13Km from Juba town. The dumping location is worked by Juba Municipality (City Council) with JICA as the counseling operators. Uncontrolled dumping begun in 2006 along the most street with genuine controlled dumping method as of September 2012 and is embraced by JICA. Dumping is carried on daily basis, organized in cells and covered with soil. A wheel loader or bulldozer is found on site depending on

availability. Sources of solid waste to the dumping site are Juba payam, Munuki payam and Kator payam which make up Juba Municipality plus some parts of Rejaf payam with a total population of approximately 0.8 to one million.



Fig 4. Open random dumping of waste in Juba

Total area of the dumping location is 25,000m² (500m*500m) and volume of every day waste transfer in tones is around 500 tones (approx. 60 to 70 trucks * 8 tones).Waste pickers come to the dumping site daily in search of plastics such as PET bottles, nylon sacks and tyres and metal scraps like aluminum cans, etc. which they sell to recycling companies once a lot to be taken to Uganda. Most waste pickers are local people, who live on the edges of Juba city in Durupi, Lokwilili, etc. while others come from Terekaka Province. The waste pickers extend from children to grown-ups (both genders). A few are indeed lactating moms. In any case, these waste pickers are casual scavengers who need defensive equipment; as a result, they are powerless to assortment of wellbeing dangers related with waste picking exercises (Programme 2013).

There are around 15 companies operating in Juba specialized in recycling and mainly dealing with four types of recyclables. These includes:

1. Scrap metals: most targeted, collected and sold in Kenya or Uganda or Kenya
2. Blow/hard plastic: widely targeted, shredded and sold in Uganda or Kenya
3. Small-scale recycling initiatives where bottled water companies shred their defect plastic bottles and export to Uganda or Kenya

- Aluminum and especially beverage cans are collected, melted and formed into gate decorations or simply compressed together and sold in Uganda or Kenya for melting.

However, by then, the two main companies where the Philing Environmental and Southern Express. The Southern Express for the case was registered in 2006 and is one of the companies contracted in 2008 for garbage collection and disposal with 12 trucks and one loader but currently most of the equipment are broken down hence limited their efficiency of work to deliver the services to the communities (Ministry of Health 2012).

The stakeholder's gathering was proposed to include the National Service of Environment, Service of Fund, Service of Physical Framework, significant state services, City Chamber and other local governments, Commerce sector, NGOs, CBOs, UN and universal advancement organizations (Progamme 2013). However, Juba City Committee, health officers from the three payams (Juba, Munuki and Kator), Juba County, Rejaf Payam, UNEP and JICA are improving waste management within the city but it is still at the beginning of the process. JICA and UNEP are providing the technical assistance in MSWM at present with funding from USAID, UK, etc.

However, so many challenges exist in Juba city regarding to recycling and solid waste management in Juba and South Sudan at large, which can be categorized into the following categories (Charles Mahmoud Sebit Many October. 2017)).

Awareness and education

- Lack of awareness for recycling among government officials and other key stakeholders.
- Negative attitude and stigma towards waste collection and recycling by the population due to local norms and culture.
- Lack of health and environmental education in the community.
- Lack of skilled personnel able to work in SWM or recycling.
- Language barrier among stakeholders making cooperation difficult.

Technical issues

- Lack of (access to) recycling equipment in Juba or South Sudan.
- Waste workers lack technical skills related to recycling processes and equipment.
- Lack of infrastructure and power to operate recycling equipment.

Policies

- No clear or adequate policies on SWM and recycling.
- Lack of clear regulations on SWM.
- National, state and local authorities unable to enforce policies and regulations.
- Inefficient SWM system.

Co-ordination

- Lack of co-ordination among key stakeholders.
- Public health officers not involved in waste management

Funding

- Lack of government funding and financial resources in SWM sector.

- Lack of private sector interest and funding in recycling business.
- High operational costs and expensive SWM and recycling equipment.
- Private investment deterred by insecurity

Market for recyclables

- No demand for recyclables items in Juba, South Sudan.
- Transportation within South Sudan and to Kenya or Uganda is difficult and expensive.
- Low earnings from recyclables.
- Low quantity of segregated solid waste to be recycled.

Stakeholders' forum

- Lack of SWM and recycling stakeholder's forum that will coordinate among the different bodies (government, NGOs, CBOs, private sectors and funding institutions) involved in SWM.

Juba, where this study took place is the regional capital of South Sudan and the capital of Central Equatoria state. City authorities report that Juba legitimate occupies a total of 12 km area in diameter from the center of town (CIA 2010). Juba County, including the surrounding rural lands, encompasses generally 100 km in diameter. Juba it is likely one of the speediest developing cities within the world: (News report 2010). Roads are currently not in full good condition. But the United Nations, Chinese Companies and South Sudanese government are currently improving to repair the roads, constructing the roads and full repair is going on and expected to take some more years.

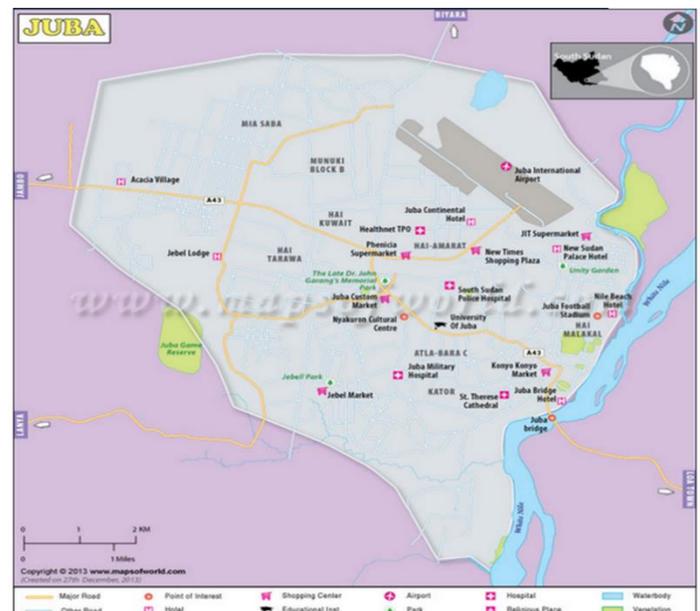


Fig 5. Main markets that generate wastes in Juba city, Source GoS 2013 Census

Juba have two main hospitals; Juba teaching hospital and military hospital and some more dispensaries and clinics as shown in the fig 5. There are four fundamental markets inside Juba, which incorporate Konyo-konyo and Custom as the main big markets, that produce expansive sum of wastes and other markets that generate waste like Suk Juba and Suk Jebel and other small markets. There is one slaughterhouse, which generates also waste

of different types and some primary and secondary schools and universities like University of Juba that generates wastes. Furthermore, there are also public institutions such as Churches, Mosques, gardens, prisons and stadium. The area also has international airport, which links it to other states within and international.

2.2. Status of municipal solid waste management in Juba city, South Sudan.

Solid waste management in Juba is under the responsibility of several stakeholders.; Comprises of; National ministry of environment, ministry of finance, ministry of physical infrastructure, relevant state ministries, city council and other local governments, business sector, NGOs, UN and international development agencies. The Ministry of Housing, Land and Public Utilities and the Ministry of Environment are both deeply involved in the topic. In Juba, these ministries are present at two different levels: Government of South Sudan (GOSS) and Central Equatoria state. Additionally, the sanitation office of Juba County is the one overseeing the on-going collection exercises inside the City Juba. As detailed from now on, both open and private partners are too included within the exercises of collection (Collivignarelli 2011).

The waste composition data for MSW produced the three (3) administrative (Payam) of Juba city council. Municipal Solid Waste core components are food waste, plastics (bag and bottle), metals, paper, aluminum, textiles, and garden waste. It contains blended composition of waste counting both degradable and non-degradable materials, and the wastes are usually collected without sorting. Compositing is one of the ways of reusing biodegradable wastes. Most of the non-degradable wastes are possibly recyclable materials, though the degradable materials can be composted. Plastics primarily come from water and natural product juice packs and containers (source Juba city council).

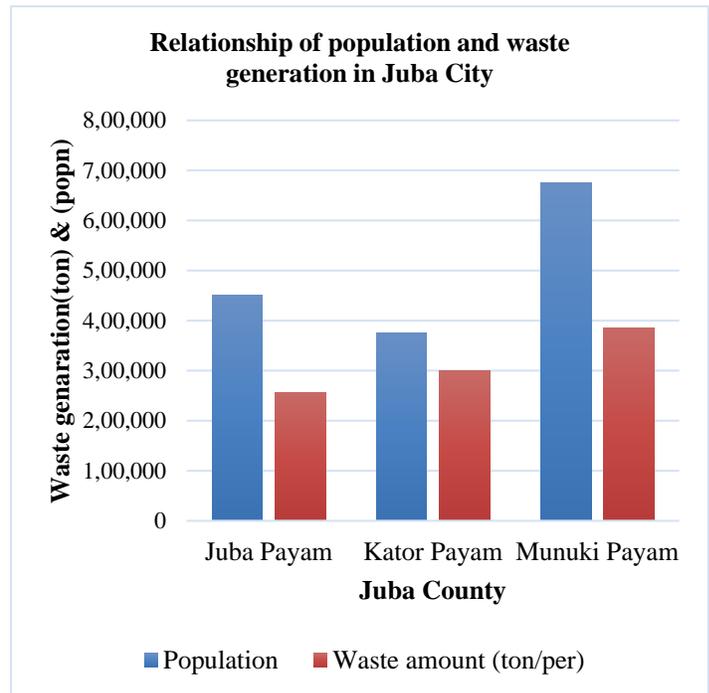


Fig 6. Residential waste generation in three Payams (t/d), 2018 data Source, Juba City Council.

The current formal framework of waste collection in place is only within the three Payams comprised inside Juba city (Juba, Munuki and Kator Payam). Within the other thirteen Payams, which form Juba County, an organized system is missing. Three different organizations are in charge of waste collection within the three Payams: They marked an assention with Central Equatoria state and Juba County. This understanding imposes rubbish collection expenses, as well as partitioning the town into three competence zones. Two private companies are responsible for the collection in Juba and Munuki Payams respectively, however the collection of waste in Kator Payam is under the responsibility of the Payam authorities. The collection service is usually limited to commercial areas and streets; only in Kator Payam the collection from residential areas is currently in place few years ago. The system of collection chosen is door-to-door; Systems of informal collection are also widespread: people owing a car collect waste from residential areas, under request, and usually dispose them in open plots or drainage channels in an uncontrolled way. This challenge is present in all the Payams of Juba.

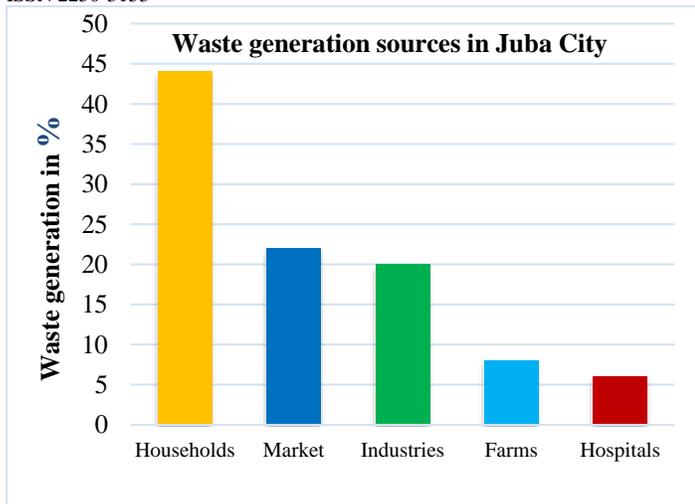


Fig.7. Juba municipal waste generations source, source Andrew Lako Kasmiro Gasim 2018.

No formal exercises of reusing are in place in Juba City. The most exercises of casual reuse and reusing regard plastic bottles, Aluminum and press. Used water plastic bottles are often collected along the streets by street children and then refilled with a local beverage or oil. Aluminum and press are reused at Konyo Konyo Market, the major market in Juba. Scrap Aluminium and iron are bought directly from householders or collected along the streets and then they are melted by using charcoal and molded to produce knives, pestles, spare-parts of cars or motorcycles and agricultural tools. At last, wastes collected by the formal framework are released in a dumping location situated around 20 km from Juba town. The site is neither provided with any measures for pollution control nor proper fenced. However, wastes are usually just disposed and accumulated on the ground. The site is a home for mosquitoes and flies and it is open to the access of animals, like goats, and scavengers looking for food. Over 480 people were reported to live close to the dumpsite, mainly making their lives from garbage. Also, waste coming from streams other than the municipal one (e.g. from the slaughterhouse or from health-care facilities) are usually disposed of at this site.

2.3. Stakeholders responsible for municipal waste management and collection in Juba

Solid waste in Juba city is managed by the department of Environment and sanitation of Juba city council, solid waste quantities, which are produced in Juba City, are large expanding with the developing prosperity and progressed standard of living. Municipal waste generation normal rate coming to 0.5720kg/per person/day (source Juba city chamber 2017), the population of Juba city is 1.500.000 Millions, such population produce roughly 950 tons of waste per day. Rain season is a higher waste generation rate. Solid waste generation changes per day in addition to the recurring seasonal variations. Collection recurrence too influences waste generations, in common, a more visit collection produces more MSW. Expanding the urbanization is one of the influences within the overall rate of solid waste production in South Sudan and many nations. The quantity of generated waste could be a financial indicator and a function of the degree of a nation's improvement. The distinction in waste generation between cities in developed nations (1.5–2 kg/person/day) and those in developing nations (generally less

than 1 kg/inhabitant/day) is essential. This critical distinction is due to utilization modes, as industrialized nations devour more items and utilize more bundling.

2.4. Solid waste collection, transportation, disposal and recycling in Juba

Juba city council, department of Environment and sanitation is a body in charge of management of all waste types within three Blocks (Payams) of Juba city but only the garbage collection just limited to the markets and business places, restaurants and road, main streets and in some areas like first- and second-class residential areas, the collection is just covering small region and the rest of private areas without collection administrations due to need of support, offices e.g.; tipper/compactor trucks to gather the garbage's, lack of private companies to take over private zones in rubbish collection. Juba city board office of Environment and sanitation has five zones all lies inside the region outline of Juba city administration overseen by a zonal facilitator alongside environmental officers and public health officers, rate collectors, bosses. Works on a centralized system where all the rubbish trucks are sent from head office to the zones no containers given by the city council. Collection and transportation are of critical significance in decreasing waste aggregation, Solid waste collection and transport are frequently conducted within the morning's hours. Lack of funding and inadequate maintenance causes a shortage of vehicles for waste collection, Juba city council ability to maintain waste collection is low and the provided vehicle/Compactors by the UNICEF in September 2016 and due to the outbreak of 2016 Civil war affected a lot the little available waste collections, some vehicles broken down and due to no good maintenance resulted to solid waste accumulations in the areas. Efficient solid waste collection depends on the proper selection of vehicles, which should be enforced with a consideration of road conditions, and availability of spare parts, servicing requirements, and transport distances. A serious concern is that most localities dispose of, and sometimes burn, their waste in random open dumps that do not support health and safety requirements. Local authorities use the burning method for volume reduction or for financial reasons. The budget for disposal is exceptionally little and does not cover advance treatment. Hence, regions perform waste disposal services according to the accessible assets from the collection fees. In turn, collection services deteriorate because the localities have highly limited financial resources (Andrew Lako Kasmiro Gasim 2019).The gathered information indicates that Juba does not employ and sorting or recycling processes for waste. Sorted recyclable wastes from family units are also uncollected. In addition, particular containers for waste isolation are unavailable. Individuals throw away materials as waste in any case of their conceivable benefits. These sorts of waste basically incorporate iron, aluminum, pipes, plastic sacks, magazines, and newspapers(Veolia 2009).



Fig. 8. Waste collection from roadside of Juba city.

2.5. Impact of solid waste on human health and environment

Unrestrained burning of solid waste and unsuitable incineration contributes significantly to urban air pollution. Greenhouse gases on the other hand are generated from the decomposition of organic wastes in landfills, and untreated leachates are known to pollute the surrounding soil and water bodies. Health and safety issues also arise from improper solid waste management. Insect and rodent vectors are attracted to the waste and can spread diseases such as cholera and dengue fever. In addition, hospital wastes are a source of defilement and contamination to both people and the natural environment as talked about in this paper. Improper disposal may be hazardous if it leads to contamination of water supplies or local sources used by nearby communities or wildlife. Sometimes exposed waste may become accessible to scavengers and children if a landfill is insecure. Medical wastes are potentially capable of causing disease and inhalation of vapors can cause: headaches; euphoria; light-headedness; dizziness, drowsiness; nausea vapor can irritate skin, eyes, and lungs over exposure can lead to unpredictable pulse, swooning, and in the long run passing on. Readily absorbed and can cause severe burning if brought into contact with skin/eyes/lungs inhalation results in chest pains, increased heart rate, coughing, nose and throat irritation, shakings, and eventually death. Moreover, can cause serious burning to skin, eyes or lungs if contact made can genuinely influence lungs and respiratory system in breathed in (aspiratory edema, lung irritation) possibly deadly ingestion causes sickness, vomiting, gastrointestinal disturbance and dying over exposure can lead to kidney and liver harm.

However, some of the commonly reported work-related health and harm issues in solid waste management and disposal includes;

- Infections from direct contact with contaminated material, dog and rodent bites, or eating of waste-fed animals;
- Puncture wounds leading to tetanus, hepatitis, and HIV infection;
- Injuries at dumps due to surface subsidence, underground fires, and slides;
- Headaches and nausea from anoxic conditions where disposal sites have high methane, carbon dioxide, and carbon monoxide concentrations; and

- Lead poisoning from burning of materials with lead containing batteries, paints, and fuses. The common illness within the consider area according to public health inspector in Juba city incorporates: diarrhea, jungle fever, viral illness, eye infections and skin infections. The major causes of these illnesses is poor environmental sanitation, inappropriate disposal of refuse and human farces, insufficient water supply, destitute lodging and terrible nourishment cleanliness (Cointreau 2006).

2.6. Current common environmental problems

Right now, world cities produce almost 1.3 billion tons of solid waste per year and this volume is anticipated to extend to 2.2 billion tones by 2025, more than multiplying in lower wage nations. This may influence health population due to be caused by vector borne illnesses and chance of fire close where family waste is kept, without satisfactory requirement of the existing environmental legislation and expanded public involvement, vital components of the integrated waste management (UNICEF 2009). There is inexhaustible discharge of vaporous, poisonous substances into Juba town environment as well as risking of wellbeing of scavengers as a result of burning of obsolete e-wastes. Due to contact with smokes from burning of solid wastes and gaseous emission from dumpsites, cases of several diseases have been recorded (Oyelola 2009). Solid wastes are dangerous in nature since they accumulate and contaminate the ground and surface water and are toxic and breeding grounds for insects and fly which in turn are the sources of several diseases. Further, percolation of leachate to ground water sources may cause severe health problems if used for drinking water purposes (Tchobanoglous 1993), (Beigl P. 2009). As such, environmental friendly strategies for administration of municipal solid waste management have ended up a worldwide challenge in confront of competition with constrained assets, quickly expanding population, urbanization and around the world industrialization (Katiyar R.B. 2013).

Government ought to strengthen waste collection and transfer frameworks in each state whereas reinforcing and upholding the fitting laws. To avoid genuine environmental disaster, priority ought to be given to waste management (Oyelola 2009). Open dumpsite approach as solid waste transfer strategy could be a primitive organize of solid waste management in numerous parts of the world. It is one of the foremost ineffectively rendered services by municipal specialists in developing nations, as the frameworks connected are informal, obsolete and in- proficient. Solid waste transfer destinations are found both within and on the outskirts of developing urban cities. With in-crease within the worldwide population and the rising request for nourishment and other fundamentals, there has been a rise within the sum of waste being produced every day by each house- hold. This waste is eventually thrown into municipal transfer destinations and due to destitute and incapable administration, the dumpsites turn to sources of natural and wellbeing dangers to individuals living in the vicinity of such dumps. One of the main aspects of concern is the pollution caused to the earth—be it land, air and water.

According to Nguyen, Solid waste disposal sites are found on the outskirts of urban areas. These zones gotten to be children's sources of defilement due to the increment and increasing of flies, mosquitoes, and rodents. They, in turn, are infection transmitters

that influence population's health, which has its natural protections in a developmental and imaginative state (Nguyen 2011). They said that, circumstance produces gastrointestinal, dermatological, respiratory, hereditary, and a few other kind of irresistible infections (A. 2013). The UNEPA expressed that wastes that are not overseen legitimately, particularly solid waste from family units and the community, are a genuine health risk and lead to the spread of irresistible illnesses.

The report further expressed that unattended wastes lying around draw in flies, rats, and other animals that, in turn, spread infections. Regularly, it is the wet waste that de-composes and discharges a terrible odor. The awful odor influences the individuals settled next to the dumpsite, which appears that the dumpsites have genuine impacts to individuals settled around or next to them ((UNEP) 2006). The group at risk from this destitute transfer of solid waste includes-the population in regions where there is no legitimate waste disposal strategy, particularly the pre-school children, waste laborers and specialists in offices producing poisonous and irresistible materials. Other high-risk group incorporates population living near to the waste dump (al. 2010). In specific, organic residential waste poses a genuine danger, since they mature making conditions favorable to the survival and development of microbial pathogens. Coordinate dealing with of solid waste can result in different sorts of irresistible and unremitting illnesses with the waste workers and rag pickers being the most vulnerable (Nwanta J. A. and Ezenduka 2010).

Open dumpsites are a major problem to the environment especially to the air that we inhale. Dumpsites emit horrible odors and smoke that cause illness to people living in, around, or closer to them (Marshall 1995). Agreeing to Medina, 2002 contamination, a major environmental impact of dumpsites, isn't straightforwardly exchanged from land to people, but within the case of cleans and direct contact with harmful materials. Pollutants deposited on land usually enter the human body through the medium of contaminated crops, animals, food products, or water. In addition, the dumpsite has smelly and un-slightly conditions. These conditions are worse within the summer since of extraordinary temperatures, which speed up the rate of bacterial activity on biodegradable natural fabric. Transfer sites can also make health at risks for the neighborhood (Boardi K. O. and Kuitunen 2005).

3. Public participation in solid waste management

In many parts of the world, communities continue to be looked at as passive recipients of government services, and are very often ignored even in local decision-making processes (TADESSE 2006). Eventually, this approach comes about within the individuals falling flat to know the role they can play within the prepare. In this manner, within the middle of several waste management and disposal strategies, interest may be a lost link/component in a conceivable formula for better solid waste management. Significant research endeavors have been coordinated to open cooperation even within the angles of reusing behavior like (BARR 2004). Be that as it may, such researches have had curiously discoveries develop in back of open interest in solid waste management. Research findings show that landfill space is now scarce and yet the communities also are less likely to accept landfills to be sited near their habitation for environmental, health and aesthetic reasons (BARR 2004). Since it may not be

practical to utilize waste management strategies of an despotic nature, the interest of the individuals in solid waste management choices and practices gets to be unavoidable. Within the study on residential solid waste management in South Sudan, found out a few gaps within the solid waste management practices that would effectively point to public participation as the foremost conceivable solution. It was found out that systematic sorting of waste at the different stages right from the source to the disposal sites was lacking (JOARDAR 2000). It was also a major finding that in South Sudan, incineration has not appeared victory due to the different composition of the waste since it isn't sorted. Essential sorting should ideally be a role played by the public, at the source (of waste generation). Without waste sorting, it practically becomes difficult to manage the solid waste in a sustainable way. Other than, the way in which waste is disposed of particularly within the developing world may only suit participation of the public in order to switch the impacts of poor solid waste disposal (JOARDAR 2000). The most widely practiced municipal disposal method has been uncontrolled dumping, concentrated in low-lying fringe locations and leading to leachates percolation and pollution runoff and contamination of soil, ground water, canals, and river ways". Uncontrolled dumping when practiced aimlessly by the public, it imposes far-reaching impacts as Sauro focuses out. In any case, in itself, dumping isn't a feasible way of management of waste, it would really be a qualified damaging strategy, however it can be controlled and the impacts switched in case the public were included within the waste management and disposal structure. However, the process of public participation may sometimes be long and not cheap in terms of time. To a few individuals, it may not indeed be important. Nevertheless, it is nearly inconceivable to talk almost sustainable development and at the same time avoid the need to have the individuals included. This is because in present-day development practice, growing awareness of the importance of people's non-expert experiences and knowledge has continuously led to a terrible need for shared decision-making in various contexts (BARNES 2005). The input of the public isn't insignificant in any given sector since of their applied impact on the heading of improvement.

4. Challenges of solid waste management in developing countries

Municipal solid waste management (MSWM) in developing nations can be depicted as lacking service scope, operational wasteful aspects of administrations, insufficient management of unsafe and wellbeing waste and environmental issues. The quantity of waste arising – solid, liquid and gaseous are generally considered to be growing across the globe as a result of increase in the world's population, increasing industrialization, expanding urbanization and rising benchmarks of living (USEPA 1993).

4.1. Inadequate service coverage

Solid waste collection schemes of cities in the developing countries generally serve only a limited part of the urban population. The majority of the people, especially in slum areas remain without waste collection services. These are as a rule the low-income workers living in destitute conditions in semi-urban areas. One of the most causes of insufficient collection services is

the lack of budgetary assets to manage with the expanding sum of produced waste created (Zurbrugg 2003).

4.2. Operational inefficiencies of services

Operational inefficiencies are due to inefficient organization structures, inefficient organizational strategies, or insufficient administration capacity of the institutions included as well as the utilize of improper technologies (Nze 1978). With respect to the specialized framework, frequently the “conventional” collection approach, as created and utilized within the industrialized nations, is connected in developing nations. The used vehicles are sophisticated, expensive and difficult to operate and maintain, thereby often inadequate for the conditions in developing countries. After a short time of operation usually only a small part of the vehicle fleet remains in operation. Transport also depends on operational vehicles, and visit breakdowns coupled with parts shortages can immobilize collection vehicles for amplified periods of time. For example, UNEP estimated that in the cities of West Africa (UNEP. 1996).

4.3. Inadequate management of hazardous wastes

Healthcare wastes are produced as a result of exercises related to the practice of pharmaceutical and deals of pharmaceuticals (Zurbrugg 2003). Nevertheless, a few of the health-care wastes coming from any specific clinic or institution are comparative in nature to residential solid wastes, and may be called “general health-care wastes”. The remaining wastes posture serious health dangers because of their physical, chemical or organic nature, and so are known as “hazardous healthcare wastes”. In many cases the most dangerous items in health care wastes are needles from syringes and drips, because the needles shield the virus from chemical disinfectants and a harsh external environment, and the sharp point allows easy access for the viruses into the blood stream of anyone who is pricked by the needle (WHO. 2004). The key to improving health care waste management is to provide better methods of storage and to train the staff to adopt safer working practices and segregate as hazardous healthcare wastes from the general health care wastes.

4.4. Inadequate management of human health risks issues

The decomposition of waste into constituent chemicals could be a common source of nearby natural contamination. This issue is particularly intense in developing countries where existing landfills don't meet worthy environmental benchmarks, due to restricted budgets, (UNEP. 1994). The issues related with fast urbanization once more compound the issue. As land gets to be rare, human settlements encroach upon landfill space, and local governments in a few cases encourage unused advancement specifically on best of working or as of late closed landfills. A major environmental concern is gas released by decomposing trash. Methane could be a by-product of the anaerobic respiration of microbes, and these microbes flourish in landfills with high sums of moisture. Methane concentrations can reach up to 50% of the composition of landfill gas at most extreme anaerobic deterioration (Cointreau and Levine, 1996).

5. Integrated strategies for solid waste management

Although solid waste is very challenging to manage and arrange of, it isn't continuously completely futile. Imaginative ways of managing with solid waste can be formulated to create solid waste valuable. The Centre for Ecological Technology (CET) which supports sustainable technologies in New England undertook such an effort, turning waste composting into a “way of doing business”(MAJERCAK 2002). Through collaboration with commercial transporters, commercial waste generators and, farmers, the project took off with the farmers being the composting agents who would then send the products to the market. Engaging in such a complex of collaboration, in itself presents an opportunity for constructing a collaboration that would beneficially take advantage of solid waste to make it productive. This would result into a double gain since composting can fit exceptionally well within the commercial center elements because it gives an opportunity for benefits both financially (salary to agriculturists) and ecologically (diminishing nursery gasses and lessening on leachates generation), from organic waste. Agriculturists too get enabled to manage their possess waste by utilizing it as fertilizers, subsequently minimizing on the utilize of synthetics or petroleum-based fertilizers(MAJERCAK 2002). Such an undertaking may not essentially be simple to begin and keep up, but it may definitely turn out to be beneficial.

In Africa, a very small volume of the generated solid waste is recycled or recovered as there is little “economic incentive and market for recycled materials (USEPA 2002). On one hand, (BOURNAY 2006) notes that wealthy nations proceed to send waste to Asia and Africa which turns out to extend the burden in those continents. This waste is in shape of obsolete things that not meet the buyer inclinations and measures within the wealthy nations, and or pointlessly excessive bundling of made items for send out. The defense of the rich countries is that the waste they send can be “recycled anyway”(BOURNAY 2006). On the other hand, many European nations have reusing plans for glass and paper, but the victory of such plans has moreover been decreased by the expanded generation of waste paper and glass and hence making the solid waste issue fair however to be mitigated (USEPA 2002). In addition, it moreover a few what sounds unreasonable to accept that there will be successful and productive reusing of waste in Africa, when really the most strategy of waste administration and transfer is landfilling.

Landfilling has become the immediate most possible way of managing solid waste in most African countries because of the high prevalence of indiscriminate waste dumping. The authorities that primarily bear the responsibility to clean up the cities, towns and residential areas find it easier and time saving to collect the waste and carry it to a landfill other than sorting the waste for reusing and less still for composting. Therefore, solid waste management challenges are worldwide albeit at different levels in the different parts of the world.

The United States Environmental Protection Agency(USEPA 1993), outlines and explains three main components in an integrated municipal waste management strategy- that is; waste prevention, recycling including composting and, combustion. In a review of these components,(USEPA 2002) categorically introduces and defines five main activities (in a hierarchy) classified under integrated solid waste management (waste

prevention, recycling, composting, combustion and landfilling), and the likeness is recognizable between the previous components and the afterward activities classified. This studies will discuss the following;

5.1. Waste prevention

Waste Prevention also known as source decrease within the plan, fabricate, buy, or utilize of materials and products to decrease the sum and/or harmfulness of disposed of waste. Waste anticipation too implies, in basic terms, “reducing waste by not producing it”(USEPA 2002). USEPA declares that since it decreases the sum of waste that a community must oversee, waste anticipation is the favored municipal solid waste management method. According to USEPA, source reduction includes reuse activities and “has come to be recognized as a commonsense approach with significant potential to utilize resources effectively, spare money, and decrease waste” and since of the different focal points it presents, many states within the United States of America (USA) have progressively locked in in imaginative wanders towards solid waste prevention((USEPA) 1998). Glass cycling and terrace composting are taken to be “forms of source lessening or waste anticipation since the materials are totally occupied from the transfer offices and municipal management or transportation” ((USEPA) 2002).

5.2. Recycling

Recycling includes the reuse of materials that are potential waste but are or maybe turned into important resources. The foremost imperative advantage with reusing is that it decreases the generation of greenhouse gasses since there's redirection of the waste from the landfills. Reusing too decreases the utilization of modern resources, in a way contributing to economic development. Materials like paper, glass, steel, plastic, and aluminum can be reused such that rather than arranging them of, they can be recaptured and subsequently reused.

5.3. Composting

Composting refers to the controlled aerobic biological decomposition of organic matter, such as food scraps and plant matter, into humus- a soil-like material. Compost acts as natural fertilizer by providing nutrients to the soil, increasing beneficial soil organisms, and suppressing certain plant diseases” (USEPA 2002).

6. Technologies for municipal solid waste management

MSW generation is speedily increasing in South Sudan states. These wastes need to be treated adequately to prevent environmental problems and enable a constant development of modern society. Currently, landfilling and composting are the only technologies primarily used for waste management in most developing countries (Dlamini, Simatele et al. 2019).

6.1. Vermicomposting

Vermicomposting of MSW was too proposed in a few nations. With an disturbing decrease within the availability of energy

resources, there's a recharged intrigued in inventive ways to change over the existing saves with more effective advances which will lead to a lower effect on the environment(Collivignarelli 2011). MSW is actually a resource with huge potential in terms of material and energy recovery. Thus, waste-to-energy (WtE) operations have the advantages of resource generation and the minimization of land-filled waste. Other commonly accessible advances for treatment of MSW are displayed.

6.2. Incineration

Thermal treatment utilizing incineration innovation has been recognized as an substitute appealing strategy for MSW disposal due to the essential preferences of sterile control, relative safeness, volume decrease (approximately 90%), mass lessening (around 70%) and energy recuperation (Gasim). As a result, burning of MSW has gotten an extraordinary bargain of consideration in nations with small landfill space. MSW incineration technology with direct gasification and melting has been taken as a wide-ranging technology offering high temperature, long time for gas transiting, nitrifications of various remains, no heavy metal and lower quantity of dioxin. Organic composition gasifying and mineral melting are combined to obtain fuel gas, metal and slag using this technology(Magram and Technology 2011). Incineration does have its problems and is consequently disapproved due to incomplete combustion of materials giving rise to harmful emissions, presence of chlorine leading to highly toxic dioxin and furan emissions, high working costs and utilize of supplementary powers to realize high combustion temperatures (Acanto). Products determined from MSW thermo-chemical transformation, such as syngas and bio-oil, may be specifically utilized as fuel, included to petroleum refinery stocks, upgraded utilizing catalysts to premium review fuel or utilized as chemical feedstock. Extraordinarily, generation of a fluid fuel product increments the ease of taking care of, capacity and transport and hence, the product does not ought to be utilized at or near the reusing plant (Nguyen 2011).

6.3. Landfilling

Landfilling has long been the most common disposal method for MSW, especially in developing countries, because of its simplicity, low investment and operational costs and easy operation. A typical landfill may be a source of three stages of waste products: solid (wastes), liquid (leachate) and gaseous (landfill gas), which may pose a threat to the individual elements of the environment ((UNEP) 2006)MSW landfills are also potential sources of offensive odors causing irritation, which may cause decreased quality of life and negative magnitudes on human health and wellbeing. The impacts of producing and treating landfill gas (LFG) and leachate have been the essential concerns of analysts as the major environmental issues related with MSW landfilling. Treatment of MSW by landfilling has been, and still is, connected with a danger of pollution (Patz, Graczyk et al. 2000). In case executed legitimately, selection of sanitary landfill can offer assistance in creating resources like landfill biogas, offering of processed deny as fertilizer as well as offering benefits of resource generation through CDM. Pyrolysis: Pyrolysis is considered as an inventive alternative for treating MSW. Pyrolysis

has been inspected as an alternative for MSW disposal that allows energy and resource recovery (Remigios and Journal 2016). Pyrolysis is the thermal debasement of waste within the nonappearance of oxygen.

7. Conclusion

Municipal solid waste management in Juba city is still in its earliest stages, missing fitting specialized solutions, adequate organizational capacity and participation among wide extend of stakeholders, in this manner, the management of solid waste in Juba town under the City Council need to improve and put more efforts to management. However, the challenges of MSWM in Juba are immense, ranging from lack of strategic planning, which is attributed to lack of capacity, being the overall challenge. Lack of capacity has resulted to a catch phrase, "Capacity Building", often used by aid agents in South Sudan in all different sectors. Dismissing the public in decision making or arranging adds to another challenge. The needs of the people are not understood, as a result, they will not be part of such programs. Regarding the cultural and socio-economic aspects, Juba municipality faces the challenge of behavior pattern and underlying attitude of the citizens not oriented towards waste conscious behavior, factors that are shaped by the local cultural context. Most of the inhabitants of Juba live in slum areas where SWM services are insufficient or totally missing. The challenge the MSWM faces is that no space among the densely packed settlement for refuse containers, narrow roadways, steep gradients and un-surfaced roads that standard collection vehicles cannot manage. The commitment of leaders at the municipal levels to actualize plans is disintegrated when discussions emerge about the obligation or jurisdiction of the waste sector driving to the disappointment of such projects.

Waste is dumped aimlessly which ends up blocking all the waterways and drainage system. This has driven to spread of infections and floods causing misfortune of lives. The quantity of solid waste tended to increase in level of income, activity, changes in eating habits and the widespread use of disposable containers and packages resulting in huge amounts of waste and geographic factors. It was realized, according to the assessment the public were aware of their actions pertaining to waste management since they are seeing the effect but the blame is pushed on the government as not doing its work. Final disposal of solid wastes is completely by improper methods, weakness of environmental awareness about solid waste, presence of health hazards and environmental problems due to the final disposal of solid waste, and finally regulations and law that recognize, so the following recommendations are suggested for consideration.

- (1) The public must be educated and aware on the impact of solid waste on human and environmental health through various means of communications.
- (2) The concept of waste management progression should be embraced, which aims at extricating the most extreme practical benefits from products and to create the least sum of waste through the "3Rs", Reduce, Reuse and Recycle.
- (3) Solid waste service revenues should not flow into the general municipal account so that it is not absorbed in the overall expenditures, instead the revenue should remain with waste sector

in an autonomous accounting procedure, that make it easier to improve and/ or extend services.

- (4) A democratic public process of SWM policy formulation is essential to determine the actual needs of the citizens and therefore, to prioritize the limited municipal resources in a just manner.

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Performance contract scenario and socio-economic development of Rwanda

A case study of Gatsibo district in Eastern Province

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Abstract: The topic of this research is “performance contract scenario and socio-economic development of Rwanda” a case study of Gatsibo District. The purpose of this study was to find out the social and economic effects of performance contracts in Gatsibo District and to find out challenges of the performance contracts and possible strategies for improvement. The problem at hand was that; reconstructing a nation from ashes was nearly impossible in Rwanda after the scourge of war and genocide that took almost a million of people and left many others with physical and psychological wounds. Hence there was need to come up with unusual solution to socio-economic reconstruction of the society, thus Imihigo emerged as paramount home grown solution to speed up the process. The researcher used purposive sampling and simple random sampling to select respondents in conformity to the realization of the objectives of the study. The suggested respondents were leaders & people of Gatsibo district. For collecting primary data, well-structured questionnaire were employed to 80 respondents from two Sectors respectively, one of an urban and of rural setting, Kabarore and Murambi sectors, whereas interviews were employed to 10 people 5 local leader and 5 opinion leaders. Data were edited and sorted for the next stage and after presented in tabular forms, with frequencies and percentages for classifications of responses by Statistic Package for Social Sciences (SPSS) for easier analysis and interpretation

The main findings are for instance most of respondents affirmed of 4 components of imihigo; the economy, social welfare, governance and social justice and agreed that there has been a steady increase in all these components and poverty levels have been decreased vividly, further many policies and programs have been initiated to increase the welfare of people all over the country; to mention, minimum package for vulnerable people, housing campaign to eliminate grass houses, 12 years basic education, women and youth development programs among others. In performance contracts implementation, the common issues that have been addressed include performance improvement so as to deliver quality and timely services to the citizens, improve productivity, a sense of accountability a transparency in service delivery and the utilization of resources and grant independence to government agencies without being subjected to the bureaucracies and unnecessary procedures. The Researcher drew conclusion by clarifying that performance contracts (Imihigo) have a great role on social-economic development of people and eradication of poverty and it affects all kinds of socio-economic activities especially in relation helping the most vulnerable population and gave recommendations indicating how leaders should have a formal, rigorous, and transparent procedure for setting, evaluating and monitoring the IMIHIGO.

Key words: Performance Contracts (Imihigo), Social-economic development,

INTRODUCTION

Rwanda is a country that has been recovering from a national tragedy: the genocide of 1994, which devastated the country, amplified poverty and development has been taken at a slow rate. Many have concluded that the consolidated power structure that existed at that

time played a role in enabling that atrocity. Since then, the government was characterized by concentration of powers in the hands of few individuals at the central government level.

The Ministry of Local Government and Social Affairs (2000) argued that “ The current political, economic and social problems in Rwanda is a direct consequence of the recent political and administration history of the country the apex of which was the cataclysmic genocide of 1994, a genocide planned and effectively executed by the community and agents of the state.” Relatedly, the inappropriate, highly centralized dictatorial governance of the colonial and post-independence administration of country excluded the population from participating in determination of their political, economic and social wellbeing (Ministry of local Government and social Affairs, 2000). As a result, the government that came to power in the aftermath of the genocide has seized on decentralization as a key strategy to help prevent such a tragedy from ever happening again.

The Government of Rwanda (GOR) also views decentralization as a way to promote national reconciliation, power-sharing and participatory development at all the local level. Owing to the second phase of decentralization and local government reform in Rwanda, in 2006, the government of Rwanda started the development strategies based on performance management contracts. Performance contracts are agreement between an administrator (predominantly superintendents) and the subordinates to accomplish the agreed upon task in a specified time bound using specified resources given (Bushweller 1997).

For Marry et al. (1999:33) A performance contracts is an agreement between a government and a public agency which establishes general goals for the agency, sets targets for measuring performance and provides incentives for achieving these targets. The use of performance contracts has been acclaimed as an effective and promising means of improving the performance of public enterprises as well as government departments. It is on this regard that all government institutions from the district and the city of Kigali, plus other government institutions signed performance management contracts with the office of the president of the republic of Rwanda indicating their short term programs and goals. According to (Shirley, 1997:23) performance contract in public sector is viewed as a device to reveal information and motivate workers to exert efforts towards socio-economic development.

In this regard, the government of Rwanda has done reforms to its different preoccupations; strategic orientation of the government has been developed in vision 2020, in this strategy, the poverty reduction elaborated with the participation of partners and actors of the government, it is in this vision that this research will elaborate the impact of performance contracts and as instrument for socio-economic development of Rwanda taking Gatsibo District as a case study. Performance contracts represent a state-of – the - art as a tool for improving public sector performance. They are now considered as an essential tool for enhancing good governance and accountability for results in the public sector Which is prerequisite to development (Elizabeth H. 2007) .

Therefore, to achieve its development strategies Rwanda has embarked on the system of performance contract so as to achieve durable and sustainable development.

1.1 Statement of the problem

Performance contracts (IMIHIGO), is one of the traditional home grown solutions used in social and economic development of Rwanda that is designed as performance management contracts signed between the President of the republic and the ministers, heads of Government institutions and the District Mayors on behalf of their constituencies. It is in this regard that the performance contracts in decentralized levels of administration seeks to ensure effective and sustainable use of public resources, to guarantee transparent, accountable and participatory decision making and to enhance delivery of basic services.

Therefore, the public engagement is recorded publically in a written contract document that presents a set of development targets backed by specific performance indicators over a period of one year. It's on this regard that the study seeks to find out the relationship between performance contract and socio-economic development and verify if performance contract is a paramount to socio-economic development.

Underlying this vision is the firm belief in a society that offers a peaceful environment to its people, along with the conditions for developing the collective and individual potential of all Rwandans to contribute to poverty reduction and economic development.

1.5.1 The general objectives

The general objective of this study is to examine if performance contracts is an instrument fostering socio-economic development.

1.5.2 Specific objective

1. To find out if performance contracts is a prerequisite to socio-economic development
2. To examine the impact of performance contracts on the socio-economic development
3. To find out challenges behind the implementation of performance contracts
4. To find out measures being used to overcome performance contract challenges in decentralization levels of leadership.

1.2 Research question

These are questions that are raised that the research will seek to answer so as to address the research problem and objectives stated (okurut,2007:8) thus the research questions to this study are as follows;

1. What is the impact of performance contracts on the socio-economic development of Rwanda?
2. Do you find the scenario of performance contracts as a prerequisite to socio- economic development of Rwanda?
3. What are the challenges of performance contracts in the decentralized levels of leadership?
4. What measures are there to overcome the above challenges?

LITERATURE REVIEW

Definition of key terms

Performance

Campbell's (1999) defined performance as behavior or action relevant to the attainment of an organization's goals that can be scaled, and measured. Ramanjam (1986), indicated that a narrow definition of performance focuses on the use of simple outcome-based financial indicators that are assumed to reflect the fulfillment of the economic goals of the firm. According to Draft (1991), performance is the organizational ability to attain its goals by using variable resources in efficiency and effective manner. Performance is also an abstract of concept and must be represented by concrete, measurable phenomena or events to be measured. It covers different types of activities (Bateman et. all., 1990).

Performance Contract

Performance Contract is defined as a freely negotiated performance agreement between the Government, acting as the owner of a Government agency, and the agency itself. It clearly specifies the mutual performance obligations, intentions, and responsibilities between the two parties (Performance contracting guidelines, 2009). A performance contract constitutes a range of management instruments used to define responsibilities and expectations between parties to achieve mutually agreed results. It is a useful tool for articulating clearer definitions of objectives and supporting innovative management, monitoring and control methods and at the same time imparting managerial and operational autonomy to public service managers (Performance contracting guidelines, 2009).

Performance contracting was set up with the following objectives; improving service delivery to:

Development

The word development has got many meanings depending on the context in which it's being used eg according to the Cambridge International Dictionary of English (1995, pg 377)

Development is defined as “growing and becoming more advanced”. On the other hand, development is highly valued or positive chain in a specific direction interpreted by persons, community/society or a country as a desired goal.

Thus, according to JAMES. K. (1997:4), asserts that

“Development means the process of general improvement in the level of living together with the decreasing income distribution, and the capacity to sustain continuous improvement over time, the components of socio-economic wellbeing are substance of development...”

Development also involves any and all kinds of activities which increase the capacity of people to meet their needs and improve on their lives. Development is also a process of transformation or changes by which people of a given society increase their wealth and manage their resources so as to improve their lives. It is also the process which elements that cause inequalities and marginalization in society are gradually eliminated. Therefore, development is quantitative improvement and transformation of society from one stage to another as measured by indicators such as reduced incidences of disease and poverty, improved standards of living, increase in productivity, increase in household income, mass education, increased leisure, freedom and liberty etc.

Todaro (2000) summarizes development as a multi-dimensional process involving major changes in structure, attitudes and institutions as well as the acceleration of economic growth, the reduction of inequality and eradication of poverty. MICHAEL. P. T (1997:415), says that development is the process of improving the quality of all human lives. He gave the following aspects;

- Raising people's living levels that is to say, their incomes and consumption levels as food, medical services, education etc. through relevant economic growth.
- Creating conditions conducive to the growth of peoples' self-esteem through the establishment of social, political and economic systems and institutions which promote human dignity and respect.
- Increasing people's freedom to choose by enlarging the range of their choice variables for example; increasing varieties of consumer goods and services

It important to note that development doesn't focus on one single issue but involves the whole person and his/her environment ie implying that it encompasses the political, psychological, cultural and economic dimensions of society/people's lives.

Socio-economic development

Socio-economic development is the process of social and economic development in a society. Socio-economic development is measured with indicators, such as GDP, life expectancy, literacy and levels of employment. Changes in less-tangible factors are also considered, such as personal dignity, freedom of association, personal safety and freedom from fear of physical harm, and the extent of participation in civil society. Causes of socio-economic impacts are, for example, new technologies, changes in laws, changes in the physical environment and ecological changes. (Todaro, 2000).

Social Development

According to Filgueira, 2001, Social development simply suggests improvement in the conditions and quality of life of the population. Greater levels of wealth, technological advancement, and public policies permit people to live better, to consume more, to feed themselves better, and to get sick less frequently. This idea of social development is inextricably linked to the idea of economic and material advance of human society. A second approach emerges from considering social development in terms of the distribution of the wealth that societies generate. Here, the economic dimension still constitutes a powerful factor in determining social development, but the latter occupies a space of its own, in the distributive sphere. Finally, a less normative or economic perspective on social development identifies the latter with the processes of social differentiation and social complexity associated with the capitalist and industrial transformations that gave rise to the modern world.

The concept of Performance contracts and socio-economic development in Rwanda

Imihigo is as old as pre-colonial Rwanda. Imihigo is a cultural practice in the ancient tradition of Rwanda where an individual would set himself/herself targets to be achieved within a specific period of time and to do so by following some principles and having determination to overcome the possible challenges. In the modern day Rwanda, the Imihigo practice was adopted as a means of planning to accelerate the progress towards economic development and poverty reduction. Imihigo has a strong focus on results which makes it an invaluable tool in the planning, accountability and monitoring and evaluation processes.

According to IPAR, 2016 Rwanda's extraordinary recovery from complete political, economic, and social collapse following the 1994 genocide against the Tutsi is one of Africa's most encouraging development success stories. The Government of Rwanda has since committed to undertake a fundamental, broad-based economic and social transformation intended to shift the country from low- to middle-income status, and this commitment has already yielded highly remarkable results. Rwanda is one of the few African countries that achieved most of the Millennium Development Goals (MDGs). Its real economic growth averaged 8% per annum from 2001 to 2015, which translated into significantly reduced poverty levels, from 56.7% in 2000 to 39.1% in 2014, as well as a decline in extreme poverty levels from 35.8% in 2000 to 16.3% in 2014. All these were achieved due to proper implementation of performance contracts.

When elaborating its imihigo or performance contracts, each local government administrative unit determines its own objectives (with measurable indicators) taking into account national priorities as highlighted in the International and National strategic documents such as the MDGs, Vision 2020, EDPRS, District Development Plans (DDPs) and Sector Development Plans. The Imihigo, at both planning and reporting phases, are presented to the public for purposes of accountability and transparency. The Mayors and Province Governors also sign the imihigo or performance contracts with H.E the President committing them to achieving the set objectives. The IMIHIGO process ensures the full participation and ownership of citizens since priorities are developed from grassroots level

Why 'imihigo' (objectives of Imihigo)? The ministry of Local Government in Rwanda set up the following objectives for imihigo according to MINALOC Report, 2016.

- ✓ To speed up implementation of local and national development agenda;
- ✓ To ensure stakeholder ownership of the development agenda;
- ✓ To promote accountability and transparency;
- ✓ To promote result oriented performance;
- ✓ To instill innovation and encourage competitiveness;
- ✓ To engage stakeholders (citizens, civil society, donors, private sector, etc) in policy formulation and evaluation;

- ✓ To promote zeal and determination to achieve set goals;
- ✓ To instill the culture of regular performance evaluation.

Principles of Imihigo

- Voluntary:** It is a choice, however national guidance is necessary to ensure national priorities are matching with local ones;
- Ambitious:** You promise/vow to achieve only what you do not already have;
- Excellence:** Imihigo is about outstanding performance: something worth of praise.

RESEARCH METHODOLOGY

The research design of the study descriptive design, which according to (Okurut, 2007), is suitable to analyse events and the relationship between variables. Thus this research followed two research paradigms that is to say; Qualitative and Quantitative paradigms. The target population used was 580 opinion leaders in the community from the Districts and 120 District employees. Thus the sample size was 80 opinion leaders in the community and 40 district employees respectively.

Data was collected both from primary and secondary sources especially in Gatsibo district for the reports and primary sources. Data was collected through interviews, questionnaires and documentation techniques, and data was analysed using tables, frequencies and percentages in order to determine the correlation and relationships between variables in relation to the research questions. Validity and reliability were also much considered in the study.

THE STUDY FINDINGS

This chapter presents the results and discussion of research findings. It tackles the analysis and interpretation of data both from primary and secondary sources. The data obtained were analyzed using tables percentages and frequencies. The study was driven and analysis was done basing on the following specific objectives; to find out if performance contracts is a prerequisite to socio-economic development, to examine the impact of performance contracts on the socio-economic development, to find out challenges behind the implementation of performance contracts and to find out measures being used to overcome performance contract challenges in decentralization levels of leadership.

The study revealed that performance contracts are indeed a prerequisite to socio-economic development as it has led to promotion of social welfare of the community through construction of schools and health centers identified by community members as asserted by most of the respondents in the study. Likewise in economic development, performance contracts has also led to various improvements in infrastructure development such as road construction to link rural areas to facilitate agriculture productivity in terms of markets and accessibility. In addition agriculture modernization has been sensitized and mobilized especially the crop intensification program in swamps for rice growing in Kanyonyomba and Rugarama swamps where rice is grown on a very large scale. Furthermore, it has been revealed that performance contracts has increased the development of people through quality health services as a results of mobilization mutual health insurance and easy accessibility of health services through constructed health centers and health posts (poste de sante). In Gatsibo district like any other rural area people depend on agriculture as the basic economic activity and hence, through performance contracts much has been done

Local leaders of Gatsibo district believe that the performance contracts continue to spur development and thus drive the national efforts toward achieving socio-economic welfare and sustainable development. Working on performance contracts and targeting a set of goals encourages innovation and hard work and as a result, people's lives are transformed. Referring to the statement above, Gatsibo district households always encourage people to do their activities such as agriculture, business, livestock by considering performance contracts in their daily life so as to improve their social-economic development.

Others who were administrators gave an example about the impact of IMIHIGO on social- economic development and said *“One of the priorities of economic transformation is to increase the domestic interconnectivity of the economy through investments in hard and soft infrastructure by meeting energy demands in the country. This is expected to be met through an increase in electricity at Gatsibo district. Increases in the supply of electricity are also expected to spur rural development by increasing the number of rural settlements that are able to facilitate access to basic services as well as increased access to basic infrastructure for rural households”*.

Regarding on administrators in Gatsibo district views, performance contracts have a significance role where in their sector used to prioritize economic activities especially the investment activities. The electricity got in their sector make them increase their activities permed well and easily.

A related challenge was uncovered in livestock production. The output of insemination of cows has a significant number of districts basing their count on the number of cows inseminated. However, data cows inseminated versus those successfully fertilised should be disaggregated for a true picture of the achievements under the output of cow insemination. For the evaluation, this posed a difficulty in efforts to measure progress in line with the objective of increasing livestock production. Reporting challenges were noticed in efforts to track progress under the objective of promoting entrepreneurship and business development. The evaluation noted the absence of an appropriate mechanism for recording or counter verification in regards to the output of increasing access to employment. The practice was such that most off-farm jobs were casual jobs in nature. That is, an individual is likely to shift from job to job, moving from on one project to another in a very short period of time, while potentially being counted numerous times among employment beneficiaries.

CONCLUSIONS AND RECOMMENDATIONS

The research had the following conclusions as regards performance contracts and socio-economic development in Rwanda;

First: it was very much evidenced that performance contracts affect positively the socio-economic development of Rwanda, in social welfare much has been developed in education sector and health sector and economic developments there has been paramount progress in infrastructure development in agriculture and livestock, crop intensification programs among many other not forgetting employment promotion in rural agricultural areas.

Secondly: In social development, one of the key objectives is to ensure access to quality education and skills development. On the output of quality education, the findings from this evaluation point to significant shortcomings. Most problematic was that while the target is to improve the quality of education, the targets identified to achieve this objective focus primarily on infrastructure (constructing classrooms and toilettes). Important as infrastructure is for effective education, they should not be the primary indicators for measuring the quality of education. Citizen participation and satisfaction rates have been steadily increasing. However, the

evaluation noticed a tendency for local authorities to exaggerate the extent to which households inform Imihigo. The citizen notebook will illustrate this point. Citizens are asked to purchase a note book in which they note their Imihigo targets for the upcoming year. Instead, they often scribe in their notebooks the assets they already possess instead of the targets they intend to achieve in the coming year. Most problematic was where testimonies from ordinary people that some local authorities are the ones to complete their household Imihigo notebooks, practice that undermines the whole idea of household Imihigo. The evaluation team also found situations where some households do not possess these notebooks. Taken together, therefore, these accounts seem to contradict the claims by local leadership about the extent of citizen participation in the Imihigo processes.

Thirdly: Sectors continue to face challenges with issues of measurement, especially with outcomes. Even with outputs it can be difficult to find accurate measures for specific activities. Governments carry out a wide variety of functions, from building roads to providing advice on foreign travel. Performance measures are more easily applied to certain types of functional and programme area than others. Problems especially arise with regard to intangible activities such as policy advice. The functional areas with the most developed performance measures are education and health. Nearly all reforms encounter resistance, especially when they have to do with long-term budgeting practices that impact on the whole of government. Motivating key actors to move away from traditional and familiar budget practices proves to be difficult unrealistic and overambitious targets; inadequate funding sources (i.e. targets are unrealistic because not properly resourced); absence of data; poorly defined baseline, targets, indicators; poor costing of activities and confusion of activities with outputs/indicators; poor reporting systems. In performance contract implementation, the common issues that have hitherto been addressed include performance improvement so as to deliver quality and timely services to the citizens, improve productivity, instill a sense of accountability a transparency in service delivery and the utilization of resources and grant independence to government agencies without being subjected to the bureaucracies and unnecessary procedures.

RECOMMENDATIONS

1. The study recommended that additional efforts be made to consult with citizens during the preparation of *Imihigo*, particularly for targets that apply to the community level.
2. The research recommended that the central government take measures to ensure timely facilitation, guidance, and transfer of funds.
3. The research also recommends that, more efforts be made in mobilization of ownership of performance contracts at the household levels as the study found it as the heart of socio-economic development.

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Knowledge of Antibiotic Misuse among Patients with Oral Infections in Dental Units of Al-Najaf Primary Health Care Centers(PHCCs)

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Abstract- Background: Antibiotics are active substances that affect the growth of bacteria. The misuse leads to resistance to antibiotics and thus causes consequences for the health of the community. Knowledge of Antibiotic Misuse among Patients with Oral Infections in Dental Units of Al-Najaf Primary Health Care Centers(PHCCs). The misuse of antibiotics has become a societal issue, a major public health issue worldwide. **Methodology:** An analytical descriptive study was conducted in the primary health care centers and the dental specialist center in the city of Najaf from November 2020 to March 2020; the sample was collected using a non-probability (convenience sample) of (450) participants are selected from the primary health center in AL-Najaf AL-Ashraf city in Iraq. The study instrument which is determined through a pilot study the validity is achieved through a panel of (21)experts. These Instruments are demographical data, sources of information, and the knowledge of patients with misuse of antibiotics. **Aim of the study:** The current study aims to assess the level of knowledge of the misuse of antibiotics among patients suffering from stomatitis and to know the relationship between the patient's level of knowledge of antibiotics with demographic and social characteristics. **Results:** The results of the current study reveal that general knowledge about the misuse of antibiotics was good 54.4%, the most influencing source of knowledge was the nurses, while it was one medical visit during the month. **Conclusion:** The study has concluded that the majority of the sample is young and male more than female. The general evaluation for misuse of antibiotics is a good knowledge. And so the significant moral relationship between the general level of knowledge with educational level, professional status, monthly income, and residency. **Recommendations:** The study has recommended the establishment of educational workshops for employees in their workplace, support for nursing staff by setting up educational sessions for the community for their effective impact on community knowledge.

Index Terms- Knowledge, Antibiotic Misuse, Oral Infections, Dental Units, Health Care Centers

I. INTRODUCTION

The term antibiotics are any organic chemical substance that stops or kills microbes. Antibiotics have saved the lives of many people around the world. The misuse of antibiotics in clinical, aquaculture, veterinary medicine, antibiotic pollution as a phenomenon has been recognized around the world.(**Jain&owsal,2013**)Worldwide, at 50%, antibiotics are purchased privately without prescription, pharmacies, and the informal sector. The use of self-medication in the United States and Europe uses antibiotics for upper respiratory symptoms that are often caused by viruses. It is a concern in developing countries for use without medical advice. (Togoobaatar teal 2010) Wrong use of antibiotics is one of the factors that allow resistant bacteria to grow and sensitive bacteria also die as a result of over-prescription and prolonged periods that lead to the proliferation of antibiotic-resistant bacteria and many developing countries have launched campaigns to motivate citizens to reduce the use of antibiotics only when necessary (Abujheisha,etal.2017). Treatment of minor and life-threatening diseases using excessive antibiotics on a large scale leads to the emergence of antibiotic resistance and the result of wrong use has positives, has negative aspects in terms of health, economics and its impact on society .(Oberoi , teal 2015)Antibiotics are widely used and are an important part of the prevention and treatment of diseases, suspected diseases in dentistry, after surgery, and gum infections. The dentist must arrive at the correct diagnosis in order to avoid the wrong use of antibiotics. Studies of antibiotic misuse have been conducted in Western countries, and studies have revealed the wrong and inaccurate use of antibiotics . (Gowri, etal.2015). Dentists have their treatment either by surgery or giving the antibiotics that they depend on for tooth infections, the prescription for experimental dentistry is considered to have several perceptions, recommendations for treatment, expected bacterial resistance or the treatment may be inappropriate, which in turn encourages the increase of bacterial resistance.(González-Martínez, etal.2012). The dentist prescribes antibiotics for preventive reasons as a result of changing natural bacteria into pathogenic as well as preventing endocarditis. Therapeutically in soft and hard tissue diseases in the oral cavity and gums, as well as in surgical cases in the mouth, misuse of antibiotics leads to increased resistance.(

Peedikayil,2011). In the twentieth century, the greatest invention was the invention of antibiotics, due to the high mortality from infectious diseases and diseases worldwide. Misuse of antibiotics is a large number of buying them without a prescription, especially for developing countries, and that excess of them quickly became resistant to antibiotics is an important issue in India. (Agarwal, etal 2015). Antimicrobial resistance (AMR) affects millions of people and threatens human health Increased use of antibiotics. The resistance will evolve, amplify, and necessary Facing (AMR) challenges at the national and global political level and developing a global action plan Any (AMR) increase would have broad implications. Australia has realized reducing the misuse of antibiotics is essential to promoting health care. (Degeling, etal.2018).

Objectives of the Study:

1. Evaluate the level of antibiotic misuse knowledge among patients with oral infection .
2. Find out the relationship between antibiotic misuse among patients with oral infections and their demographic data.

II. METHODOLOGY:

Design of the Study

Across-sectional descriptive analytic design is adopted to achieve the study objective , Misuse among Patients with Oral Infections in Dental Units of Primary Health Care Centers(PHCCs)

Setting of the Study

A study was conducted in the Primary Health Centers AL Najaf Al Ashraf city in Iraq. These center are (AL-razwah. AL- Ansari. Al-Quds .AL- Nasser. Dr. Khawla Zween. AL- Mukarramah. Justice. Al-Faw . center 15 Shaaban. Health center in the military . University health center . health center in Orouba. Martyr Nasser Specialist Center of Dentistry) within the Najaf Health Directorate.

Sample of the Study

Probability sampling technique (comfort sample) from (450) accidental participants attending the dental units in the primary health centers in the city of Najaf.

Statistical analysis

The data are analysis through application data of descriptive and information statistical analysis methods

Descriptive statistical:

1. Frequency and percentage table.
2. Mean and stander deviation
3. Sum of scores to derided the patient knowledge in to the levels (high ,fair, low).
4. Bar chart.

A- Information statistical :

1. Chi-square. To test the association between the study variable .
2. One way (ANOVA).
3. Independent sample t-test.

III. RESULTS

Table (4-1) Study Sample Demographic Data

Demographic data	Rating and intervals	Frequency	Percent
Age / Years	19 and less	32	7.1
	20- 29	168	37.4
	30- 39	114	25.3
	40- 49	78	17.3
	50 and more	58	12.9
	Total	450	100
Gender	Male	232	51.6
	Female	218	48.4
	Total	450	100
Levels of Education	Doesn't read and write	9	2
	Read and write	18	4
	Primary school	69	15.3
	Intermediate school	127	28.2
	Secondary school	65	14.4
	Diploma	61	13.6
	College	94	20.9
	Post-graduate	7	1.6
	Total	450	100
Occupational status	Jobless	80	17.8
	Employee	100	22.2

	Free job	154	34.2
	Housewife	116	25.8
	Total	450	100
Monthly Income	Sufficient	120	26.6
	Insufficient	196	43.6
	Barley sufficient	134	29.8
	Total	450	100
Residency	Urban	328	72.9
	Rural	122	27.1
	Total	450	100
Smoking	Yes	105	23.3
	No	345	76.7
	Total	450	100

This reveals that the (37.4%) of the study subjects are (20-29) years old and (51.6%) of them are male. Regarding levels of education, the study results indicated that (28.2%) with intermediate school graduated in addition. The study results show that (34.2%) are of free job, (43.6%) exhibit insufficient monthly income, (72.9%) are urban residents, and (79.7%) are non-smoking persons.

Table (4-4) Overall evaluation of patients' knowledge regarding antibiotics misuse

Main studied domain	Levels	Freq.	%
Overall evaluation of patients' knowledge	High	245	54.4
	Fair	201	44.7
	Low	4	.9
	Total	450	100

N (450), high (sum of scores 62-79), fair (sum of scores 44-61), low (sum of scores 26-43)

This table depicts that more than half of the sample has a high level of knowledge regarding antibiotic misuse (54%).

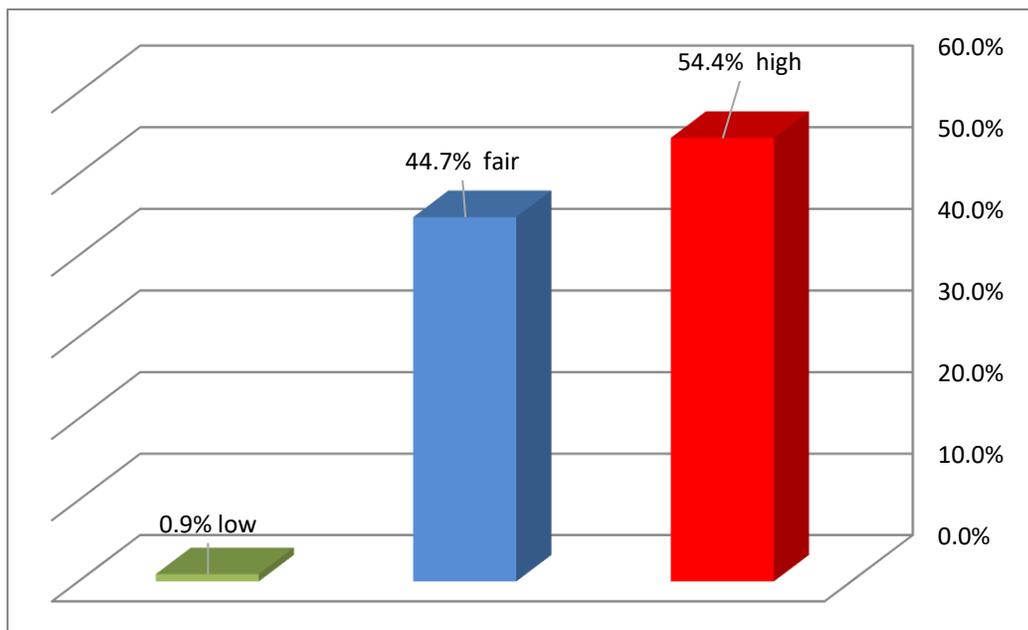


Figure (1) Overall evaluation of patients' knowledge regarding antibiotics misuse

Table (4-6) Analysis of variance (ANOVA) of patients' knowledge according to their educational levels, occupation and monthly income

Demographic data	Rating and interval	N	Mean	Std. Deviation	F	p-value
Levels of education	Doesn't read and write	9	1.9573	.12078	7.608	0.001 HS
	Read and write	18	2.2650	.22769		
	Primary school	69	2.2603	.28102		
	Intermediate school	127	2.2925	.28222		
	Secondary school	65	2.2941	.23752		
	Institute	61	2.4836	.22200		
	College	94	2.3822	.28990		
	Post-graduate	7	2.4615	.19231		
	Total	450	2.3273	.27818		
Occupation	Jobless	80	2.2192	.26558	12.919	.001 HS
	Employee	100	2.3265	.27078		
	Free job	154	2.4256	.24376		
	Housewife	116	2.2719	.29557		
	Total	450	2.3273	.27818		
Monthly income	Sufficient	120	2.3769	.24298	8.468	.0001 HS
	In sufficient	196	2.2669	.29589		
	Barley sufficient	134	2.3711	.26556		
	Total	450	2.3273	.27818		

Table(6) shows that there is a high – significant difference between the patient knowledge based on the levels of education, occupation and monthly income.

Table (4-7) Mean difference (independent sample t-test) of patients' knowledge according to their residency

Main studied domains	Residency	N	Mean	Std. Deviation	t-value	d.f.	p-value
Overall patients' knowledge	Urban	328	2.4445	.26394	5.637	448	0.0001 HS
	Rural	122	2.2837	.27100			

Table(7) shows that there is a high – significance different between the patient knowledge according to their residency .

Table (4-10) Mean difference (independent sample t-test) of patients' knowledge according to times the patients use of antibiotics

Main studied domains	Misuse AB	N	Mean	Std. Deviation	t-value	d.f.	p-value
Overall patients' knowledge	Always	87	2.2378	.30778	3.377	448	.001 HS
	Rarely	363	2.3487	.26664			

Table(10) shows that there is a high – significant different between the patient knowledge and the frequency of antibiotic misuse

Desiccation

Table (1) Study Sample Demographic Data

This reveals that the (37.4%)of the study subjects are (20-29) years old and (51.6%) table them are meal . regarding levels of education , the study results indicated that (28.2%) with intermediate school graduated in addition . The study results shows that (34.2%) are of free job, (43.6%) exhibit insufficient monthly income, (72.9%) are urban residents , and (79.7%)are non

smoking persons. These results tally with the study by Kadhim & Khudair, 2019

Table (4) Overall evaluation of patients' knowledge regarding antibiotics misuse

N (450), high (sum of scores 62-79), fair (sum of scores 44-61), low (sum of scores 26-43)

This table depicts that more than half of sample with high level of knowledge regarding antibiotic misuse (54%). previous studies match the current study as André et al. 2010 in Sweden, and Kim et al ., 2011 in South Korea

Table (6) Analysis of variance (ANOVA) of patients' knowledge according to their educational levels, occupation and monthly income .

Table(6) shows that there is a high – significant difference between the patient knowledge based on the levels of education, occupation and monthly income. These result agree with Chang et al., 2019.how have found that there is relationship between monthly income ,education level and residency with knowledge

Table (7) Mean difference (independent sample t-test) of patients' knowledge according to their residency

Table(7) shows that there is a high – significance different between the patient knowledge according to their residency

Table (10) Mean difference (independent sample t-test) of patients' knowledge according to times the patients use of antibiotics

Table(10) shows that there is a high – significant different between the patient knowledge and the frequency of antibiotic misuse

IV. CONCLUSIONS

- 1.We conclude that those people have a good amount of knowledge regarding the misuse of antibiotics, and this knowledge is affected by their level of education, occupation and residence.
- 2.This level of knowledge makes them less use of antibiotics.
- 3.The people under investigation have a weakness in a preventive sense and that their visits are limited.

V. RECOMMENDATIONS

On the basis of the conclusions reached in the current study, the following is recommended

1. Conducting studies in this regard must be on a wider range of the sample.
2. Increasing public awareness about antibiotics use and misuse by means of social media must be consolidated

3. Developing a system that limits the sale of antibiotics to the prescription should be continued only by doctor's
4. Dentists should be obligated to prescribe the antibiotic after mouth smear.

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Ten Year Retrospective Studies on Pregnant Women with Diabetes Mellitus Progressing to Types-2-Diabetes Mellitus in Gombe South Senatorial District of Gombe State.

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Abstract- Women with Gestational Diabetes Mellitus (GDM) are known to have higher rates of cesarean deliveries and pregnancy-induced hypertension. Evidence suggests that a large percentage of these women are at a higher risk of developing type 2 diabetes mellitus (T2DM) in the future. This study was carried out on a ten years retrospective study on pregnant women with diabetes mellitus progressing to types-2- diabetes mellitus in Gombe South Senatorial District of Gombe State. A descriptive cross sectional Hospital based research design was developed for the study to assess a ten years retrospective study on pregnant women. Ten years hospital records from 2011 to 2019 were used in this study. Samples was randomly selected from four General Hospital where record of all pregnant women of different religion, culture and other characteristics was reached without being biased. Seven (7) research questions were answered using percentages, frequencies and Pearson Product moment Correlation, via SPSS version 23. The result obtained showed that majority of the pregnant women are house wives, 1626 (38.9%); majority of them, 3862(92.4%) are married; a larger number are O⁺, 1649(39.5%); followed closely by A⁺, 1255(30.0%); 3954(94.6%) are rhesus positive, while 108(2.6%) are rhesus negative. Majority of the pregnant women either have low B.P or normal B.P. Hence, hypertension is not prevalent; the pregnant women were majorly obese and severely obese (62.1% and 33.5%, respectively); almost all the pregnant women (98.1%) have a neutral pH level recorded for their urine samples. There was a negative but not significant relationship between their gestational age and blood pressure ($r = -0.02$, $p > 0.05$); there was a negative but not significant relationship between patients age and BMI ($r = -0.01$, $p > 0.05$); there was a significant negative relationship between patients' age and blood pressure ($r = -0.04$, $p < 0.05$). Pregnant women in the study area should be educated on the dangers and possibility of GDM progressing to Type II diabetes if not prevented or properly treated. Health workers and state and local government should ensure the pregnant women are properly attended to so as to prevent diabetes, and as such reduce maternal mortality or both maternal and neonatal mortality.

Index Terms- Retrospective, Pregnant, Diabetes Mellitus, Types-2-Diabetes, Patients, Gestational diabetes mellitus

I. INTRODUCTION

The prevalence rate of GDM is unknown in many countries, but it is in general said to reflect the prevalence of pre-diabetes in young reproductive women as well as background prevalence of type 2 diabetes in the given population (Hunt et al., 2007), and it is estimated that among some high risk groups the prevalence rate may be as high as 30%. Gestational diabetes mellitus (GDM), which is defined as diabetes diagnosed in the second and third trimesters of pregnancy, has emerged as a global public health concern (Hunt et al., 2007). It has been associated with short-term and long-term adverse health outcomes for both mothers and their newborns. Women with GDM are known to have decreased quality of life and increased risks of caesarean section, gestational hypertension, preeclampsia, and type-2- diabetes (Farrar et al., 2016).

In 2008-2009, the International Association of Diabetes and Pregnancy Study Groups (IADPSG), an international consensus group with representatives from multiple obstetrical and diabetes organizations, including the American Diabetes Association (ADA), recommended that high-risk women found to have diabetes at their initial prenatal visit, using standard criteria, receive a diagnosis of overt, and not gestational diabetes (American Diabetes Association Diabetes Care, 2013). The prevalence of GDM has been reported to vary widely from 3.8 to 21% in different parts of India depending on the geographical location and on the diagnostic criteria used (Seshiah *et al.*, 2009). Although, there is high rates of morbidity, most women remain asymptomatic for the duration of their pregnancy and GDM goes unnoticed until a routine screening of blood sugar is carried out. Hence, it is recommended that all pregnant women undergo screening for GDM at 24-28 weeks of gestation (Saxena *et al.*, 2011).

Gestational diabetes mellitus is defined as "any degree of glucose intolerance with onset or first recognition during pregnancy that is not clearly overt diabetes" regardless of whether insulin is used for treatment or whether the condition persists after pregnancy (American Diabetes Association, 2013). There is progressive insulin resistance starting in the mid-trimester due to

production of various placental hormones that serve as insulin antagonists (Soma *et al.*, 2016).

GDM is associated with both insulin resistance and impaired insulin secretion and shares the same risk factors with Type 2 diabetes mellitus (T2DM). Prevalence of GDM closely resembles that of T2DM in a population (Ben *et al.*; 2014). There is evidence to show that GDM is a forerunner of type 2 diabetes in predisposed women who are faced with the metabolic challenges of pregnancy (Bentley *et al.*, 2014). GDM seems to be a significant factor associated with increasing epidemic of type 2 diabetes among women and across generations in Africa and Asia, Nigeria inclusive. It is estimated that 10–31% of cases of diabetes in parous women are associated with previous GDM (Bentley *et al.*, 2014).

It is on this basis that this study on ‘Ten Year Retrospective records on Pregnant Women with Diabetes Mellitus Progressing to Types-2-Diabetes Mellitus in Gombe South Senatorial District of Gombe State’ has become important.

The diagnosis of GDM has implications for the pregnancy and also for the future health of the mother and child. Although normal glucose regulation usually returns shortly after delivery, women with prior GDM are at a higher risk of developing type 2 diabetes, metabolic syndrome and cardiovascular diseases later in life (Gunderson *et al.*, 2014). Women with a history of GDM have at least a seven fold increased risk of T2DM later in life compared to women with no GDM.

This large variation in the subsequent development of T2DM may be due to genetic differences among populations, diagnostic criteria employed to diagnose GDM and T2DM, selection criteria and duration of follow-up. The progression to type 2 diabetes increases steeply within the first five years after delivery, and then plateaus after ten years (Kim *et al.*, 2002). In addition to exposure to GDM, several factors such as ethnicity, family history of T2DM, multiparity, advanced maternal age, treatment with insulin, presence of anthropometric risk factors (pre-pregnancy and postpartum Body Mass Index, weight gain during pregnancy) and high blood sugar levels (fasting, 1 hour and 2 hour glucose levels on oral glucose tolerance test (OGTT)) in the index pregnancy have been identified as predictors of later development of T2DM (Bellamy *et al.*, 2009).

There is a growing body of evidence to suggest that lifestyle and pharmacological interventions targeted at women with GDM can prevent or delay the development of T2DM (Bellamy *et al.*, 2009). The effect of dietary and physical exercise interventions, health education and pharmacological interventions on the progression to T2DM have been investigated in randomized controlled trials and observational studies. A recent review of 30 studies aiming to prevent or delay T2DM after GDM suggests that life style and pharmacological interventions may be effective in reducing the risk of T2DM later in life (Peacock *et al.*, 2014). Since one in four women in South-East Asia has hyperglycaemia in pregnancy, preventive strategies targeted at women with GDM would have a significant public health impact on the current epidemic of diabetes and non-communicable diseases in the region (Bellamy *et al.*, 2009). There is however, paucity of data on long term risk of progression to T2DM among South Asian women who have had a pregnancy complicated by GDM in Asia.

II. RISK FACTORS FOR GESTATIONAL DIABETES

The risk factors of GDM include: Obesity with a Body Mass Index (BMI) above 30kg/m², previous large baby weighing 4.5kg or more, previous gestational diabetes, family history of diabetes (first-degree relative with diabetes) and minority ethnic family origin with a high prevalence of diabetes (Knight & Nigam, 2017).

III. CAUSES OF GESTATIONAL DIABETES

GDM may arise as a result of the following:

- i. The hormones produced during pregnancy can make it difficult for a woman's body to use insulin efficiently, increasing the risk of insulin resistance.
- ii. As pregnancy places a high demand on the body, some women aren't able to produce enough insulin to overcome this resistance. This, in turn, makes it difficult for the body to use glucose efficiently
- iii. The result is that glucose can remain in the blood at higher levels than normal leading to gestational diabetes.
- iv. Gestational diabetes usually develops in the second and third trimester of pregnancy (after 28 weeks' gestation) and then usually disappears again after the baby is born.
- v. While most women with gestational diabetes have normal pregnancies and healthy babies, the risk of some complications can be significantly increased for both mother and baby.
- vi. Post-delivery, the baby is also more likely to be overweight or have diabetes later in life (Knight & Nigam, 2017).

IV. AIM/ OBJECTIVES OF STUDY

Aim

The research centers on a ten years retrospective study on pregnant women with diabetes mellitus progressing to types-2-diabetes mellitus in Gombe South Senatorial District of Gombe State.

Objectives

- i. To identify the prevalence of gestational diabetes mellitus in Gombe South Senatorial District of Gombe state.
- ii. To assess complications of gestational diabetes mellitus that lead to types-2-diabetes mellitus after delivery in Gombe South Senatorial District of Gombe state.
- iii. To find out the proportion of pregnant women that developed types-2- Diabetes mellitus after delivery in Gombe South Senatorial District of Gombe state.

Research Questions

1. Is hypertension (high blood pressure) common among the pregnant women with types-2- Diabetes mellitus after delivery in Gombe South Senatorial District?
2. Is obesity prevalent among the pregnant women with Gestational Diabetes Mellitus?

3. Do the pregnant women have glucose present in their urine?
4. What is the analysis of the urine of the pregnant women?
5. Is there a relationship between their gestational age and blood pressure?
6. Is there a relationship between patients' age and obesity (BMI)?
7. Is there a relationship between patients' age and blood pressure?

V. MATERIALS AND METHOD

Research Design:

A descriptive cross sectional Hospital based research design was developed for the study to assess a ten years retrospective study on pregnant women with diabetes mellitus that progressing to types -2- diabetes mellitus in Gombe South Senatorial District, Gombe State.

Population of Study

The study population is the Hospital record of pregnant mothers for the past ten years from Gombe South Senatorial District. A total population of 716, 018 persons as of 2006 census.

Sample and Sampling Technique

Stratified random sampling was used to select from General Hospitals, comprehensive Health centers, primary Health centers,

Model Health centers, Health Clinics, and Maternity Clinics. Samples was randomly selected from four General Hospital where record of all pregnant women of different religion, culture and other characteristics was reached without being biased.

Validity of Instrument

Structured questionnaires was administered to all the patients used for this study.

Research Instrument

- i. **Section A:** Socio-demographic characteristics of the respondents.
- ii. **Section B:** Number of pregnancy.
- iii. **Section C:** Medical history
- iv. **Section D** Number of test been carried out during pregnancy

Procedure for Data Collection

Data was obtained and retrieved from the patient /client record in the hospital by a use of check list.

Method for data analysis.

The check list collected was analyzed with Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive statistics such as mean, standard deviation, tables, charts and inferential statistics such as logistic regression was used to test the association between variable of interest set at $p < 0.05$.

VI. RESULTS

Demography

Table 1: Demographic characteristics of pregnant women that developed types-2- Diabetes mellitus after delivery in Gombe South Senatorial District

Parameter	N	%	
Occupation	Not indicated	1770	42.4
	Farming	243	5.8
	Applicant	96	2.3
	Security personnel	8	0.2
	Business	179	4.3
	civil servant/ public servant	173	4.1
	Professionals	3	0.1
	Housewife	1626	38.9
	Student	81	1.9
Marital status	Not indicated	135	3.2
	Married	3862	92.4
	Single	182	4.4
Blood group	A+	1255	30.0
	AB	23	0.6
	B+	1190	28.5

	N	2	.0
	O+	1649	39.5
	O-	3	0.1
	Not indicated	57	1.4
Rhesus factor	Not indicated	117	2.8
	Negative (-)	108	2.6
	Positive (+)	3954	94.6

The result presented in Table 1 shows the demography of the pregnant women that developed types-2- Diabetes mellitus after delivery in Gombe South Senatorial District. The result shows that with respect to the occupation of the women, majority are house wives, 1626 (38.9%); while others are farmers, 243(5.8%); business women, 179(4.3%); civil servants, 173(4.1%); applicant, 96(2.3%); students, 81(1.9%); security personnel, 8(0.2%); and professionals, 3(0.1%). However, 1770(42.4%) did not indicate their occupation. The data on the marital status of the women shows that majority of them, 3862(92.4%) are married, while 182(4.4%) are singles. 135(3.2%)

however, did not indicate their marital status. With respect to blood group, majority are O⁺, 1649(39.5%); followed closely by A⁺, 1255(30.0%); B⁺, 1190(28.5%); AB, 23(0.6%); and O⁻, 3(0.1%). 57(1.4%) however did not indicate their blood group. For Rhesus factor, the result shows that 3954(94.6%) are rhesus positive, while 108(2.6%) are rhesus negative.

Research Question 1

Is hypertension (High BP) common among pregnant women with diabetes (SBP and DBP)?

Table 2: Hypertension among pregnant women with diabetes (SBP and DBP)

	SBP		DBP	
	N	%	N	%
Low	1106	26.5%	2139	51.2%
Normal	2987	71.5%	1922	46.0%
High	86	2.1%	118	2.8%

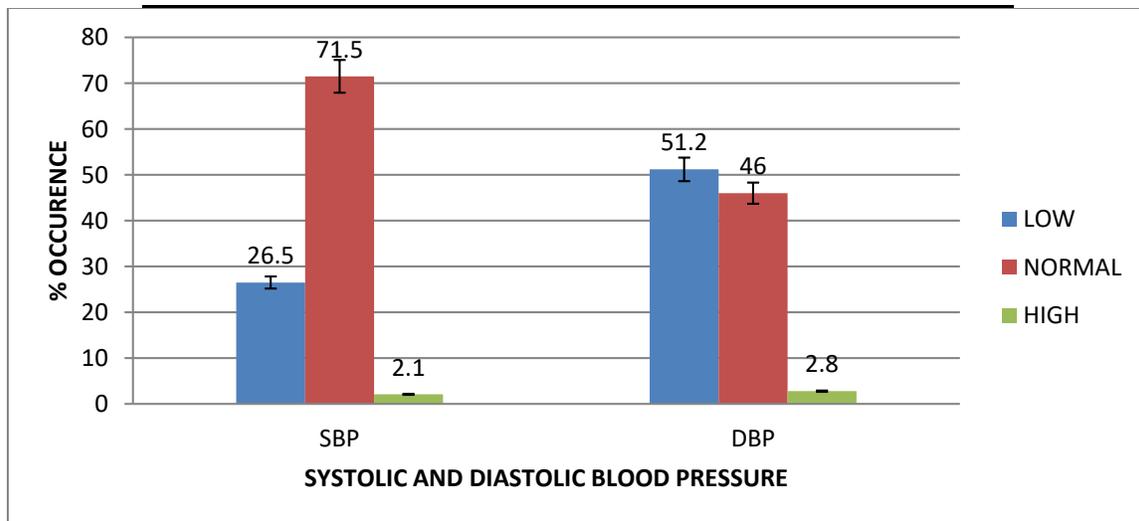


Figure 1: Hypertension among pregnant women with diabetes (SBP and DBP)

The result presented in Table 2 and Figure 1, shows that hypertension of high blood pressure is not common among the pregnant women. Using the benchmark, 141/90mmHg for High B.P.; 89/60mmHg for low B.P. and 120/80mmHg for normal B.P. Both for systolic and diastolic values, those with high B.P. are very

few, 2.1% and 2.8%, respectively. Majority of the pregnant women either have low B.P or normal B.P. Hence, hypertension is not prevalent.

Research Question 2

Is obesity prevalent among the pregnant women with Gestational diabetes Mellitus?

Table 3: Prevalence of obesity among the pregnant women with Gestational diabetes Mellitus

BMI level	Frequency	Percent
Underweight	14	.3
Normal	81	1.9
Overweight	85	2.0
Obese	2597	62.1
Severely Obese	1402	33.5
Total	4179	100.0

Using the benchmark BMI of <18.5 (underweight); 18.5- 24.9(healthy weight); 25- 29.9(Over weight); 30- 39.9(Obese) and 40 and above (severely obese), the result shows that the pregnant women were majorly obese and severely obese (62.1% and 33.5%, respectively).

Research Question 3

Do pregnant women have glucose in their Urine across the years of study?

Table 4: Level of glucose in urine

Year	+ glucose	- negative	Trace
2010	0	138 (3.3%)	0
2011	0	559 (13.4%)	0
2012	0	391 (13.4%)	0
2013	10 (0.2%)	656 (15.7)	1
2014	0	602 (14.4%)	0
2015	0	320 (7.7%)	0
2016	0	273 (6.5%)	0
2017	0	539 (12.9%)	0
2018	29 (0.7%)	651 (15.6%)	1
2019	1 (0.0%)	2 (0.0%)	0
Total	40 (1.0%)	4131 (98.9%)	2 (0.1%)

The result presented in Table 4 shows that, across the years, the glucose level recorded in the urine of the pregnant women is very low.

Research Question 4

What is the analysis of the urine of the pregnant women?

Table 5: Parameter of urine of the pregnant women

S/N	PARAMETER	PRESENT(+) [N(%)]	ABSENT (-) [N(%)]
1	Glucose	40 (1.0)	4131 (98.9)
2	Nitrate	36(0.9)	4143(99.1)
3	Urobilirubin	15(0.4)	4164(99.6)
4	Bilirubin	2(0.00)	4177(100.0)

5	Blood	6(0.1)	4173(99.9)
6	Protein	21 (0.5)	4158(99.5)
7	Ketone	25(0.6)	4154(99.4)
8	Ascorbic acid	7(0.2)	4172(99.8)
9	Amino acid	18(0.4)	4161(99.6)

The result shows that generally, only traces of urine analysis parameter were recorded, except for bilirubin which recorded 0.0% presence. However, of all the parameters, glucose, which indicates diabetes, and nitrate, which indicates infections, were most occurring.

Table 6: The pH level of the urine of the pregnant women

PARAMETER	ACIDIC N(%)	NEUTRAL N(%)	ALKALINE N(%)
pH	1(0.0)	4100(98.1)	78(1.9)

The results presented in Table 6, shows that almost all the pregnant women (98.1%) studied have a neutral pH level recorded for their urine samples.

Research Question 5

Is there a relationship between their gestational age and blood pressure?

Research Question 6

Is there a relationship between patients age and obesity (BMI)?

Research Question 7

Is there a relationship between patients' age and blood pressure?

To answer research question 5, 6 and 7, Pearson's Product Moment Correlation was used to check for relationships, and the results are presented in Table 7.

Table 7: Relationship between their gestational age and blood pressure; between patient's age and BMI; and between patients' age and blood pressure.

Variables	r	p	Remark
Gestational age versus blood pressure	-0.02	0.14	Not significant
Patient's age versus BMI	-0.01	0.63	Not significant
Patient's age and blood pressure	-0.04	0.02	Significant

Table 7 shows that there is a negative but not significant relationship between their gestational age and blood pressure ($r = -0.02$, $p > 0.05$); there is a negative but not significant relationship between patients age and BMI ($r = -0.01$, $p > 0.05$). However, there is a significant negative relationship between patients' age and blood pressure ($r = -0.04$, $p < 0.05$). This result summarily explains that, as gestational age increases blood pressure reduces; as patient's age increases BMI reduces; as patient's age increases, blood pressure reduces.

VII. DISCUSSION

Despite high rates of morbidity, most women remain asymptomatic for the duration of their pregnancy and GDM goes unnoticed until a routine screening of blood sugar is carried out. The study was carried out as a research on a ten years retrospective study on pregnant women with diabetes mellitus progressing to

types-2- diabetes mellitus in Gombe South Senatorial District of Gombe State.

The study revealed that majority of the pregnant women in the study area are house wives (38.9%); farmers (5.8%); business women (4.3%); civil servants (4.1%); applicant (2.3%); students (1.9%); security personnel (0.2%); and professionals (0.1%). The majority of them (92.4%) are married, while 4.4% are singles. The majority of the pregnant women in the study area are of blood

group O⁺ (39.5%); A⁺ (30.0%); B⁺ (28.5%); AB (0.6%); and O⁻ (0.1%). 94.6% are rhesus positive, while 2.6% are rhesus negative.

The study revealed that high blood pressure has low prevalence among the pregnant women (2.1%, for systolic, and 2.8% for diastolic). This agrees with the report of Seshiah *et al.*, (2009) who reported prevalence that vary widely from 3.8 to 21% in different parts of India. The variation in the results may be as a result of different locations. According to Ben *et al.*, (2014) the prevalence of GDM closely resembles that of T2DM in a population. That added that there is evidence to show that GDM is a forerunner of type 2 diabetes in predisposed women who are faced with the metabolic challenges of pregnancy (Bentley *et al.*; 2014).

The study revealed that the pregnant women were majorly obese and severely obese (62.1% and 33.5%, respectively). This agrees with the findings in Knight & Nigam (2017), where obesity was explained as a predisposing factor to gestational diabetes.

The study revealed that glucose, which indicates diabetes, and nitrate, which indicates infections, were most occurring in the urine samples. Although, the presence of glucose was low, hence diabetes mellitus was not common among the women. In addition, almost all the pregnant women (98.1%) studied have a neutral pH level recorded for their urine samples. This indicates that gestational diabetes was not prevalent among these pregnant women. Another study conducted by Ozumba *et al.* (2004) in Nigeria revealed a prevalence of diabetes mellitus among pregnant mothers of 1.7% (Ozumba *et al.*, 2004).

The study revealed that as gestational age increases blood pressure reduces; as patient's age increases BMI reduces; as patient's age increases, blood pressure reduces ($p < 0.05$).

VIII. CONCLUSION

Based on the findings in this study, it can be concluded that diabetes mellitus is not prevalent among the pregnant women with diabetes mellitus progressing to types-2- diabetes mellitus in Gombe South Senatorial District of Gombe State. Also, high blood pressure is not prevalent among the women. However, a large number of the pregnant women are obese. There was a negative but significant relationship between patient's age and blood pressure, indicating that as patient's grow older their blood pressure reduces.

IX. RECOMMENDATIONS

It is therefore recommended that pregnant women in the study area should be educated on the dangers and possibility of GDM progressing to type II diabetes if not prevented or properly treated. Therefore, health workers and government should ensure the pregnant women are properly attended to so as to prevent

diabetes, as such reduce maternal mortality or both maternal and neonatal mortality.

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The role of human resources professionals on the General Data Protection Regulation

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Abstract- The changes in data protection regulatory impact how we currently manage employee data. Human Resources as a function must know-how companies are faring the impact of this change. What areas companies need to be cognizant of that may open to compliance risks. This study focuses on the issues of individual data privacy breaches and being non-compliant to various data protection regulations in both local and global companies, and human resources responsibility to make it compliant. Though data privacy might apply to many industries, this study gives special reference to the business process management (BPM) industry which is one of the main industries which liaise with data processing and data managing.

Human resource professionals have a major responsibility to make the organization comply with data protection regulations despite the changing roles of human resources. There should be two-way communication between the organization and employees during this journey.

Index Terms- human resource efficiency, human resource professionals' commitment, general data protection regulation

I. INTRODUCTION

The world is consistently becoming prone to technological advancements because of globalization which implies organizations to stay up to date to be competitive. Despite being what type of business, you are in, each business has gone through a rapid transformation because of the digitalization. This enables organizations to use advanced enterprise resource planning information systems. In such organizations, all the business functions are centralized and they commonly use shared information. Therefore, information is available at fingertips, and accessing data has never been this easy. According to [2], 81% of the human resource analytics projects were jeopardized by ethical, protection, and privacy concerns. It is needed to ensure data protection and security, especially if it is a cloud, centralized information system.

Security is one of the basic needs of any human being. Especially in the modern digital world, not only physical security but also data security is equally important to all the people. Similar to governments are responsible to ensure the safety and security of the people who are living in a country, Human Resources also responsible to ensure the individual data security of the workplace.

Human resource departments use human resource information for their day to day work. Starting from candidate attracting until employees exit or retirement from the company, they have employee personal data in their centralized database. Apart from that, if the company is processing customers' data, there can be sensitive information of the customers such as financial, personal, and legal information which would be highly confidential in nature. Human Resources play a crucial role when it comes to dealing with data security [10]. Sometimes, because of the personality or curiosity for the nature of the data, human resource professionals might try to misuse that data or take advantage of data. At the same time employee may feel insecure about their data privacy, when the human resource department request to provide sensitive data such as family data, past employment data, personal interests, and other sensitive data.

Sensitive data should be managed carefully, as this might be misused by an unknown or unwanted internal or external parties. Organizations may ensure data protection on their sensitive data either ensuring proper employee ethics or establishing a data security policy or being compliant to local or international data protection regulatory bodies [7]. Further organizations may use awareness sessions, training, audits, and different risk matrices to align themselves with required standards. Even though organizations establish precautionary measurements, still there are many incidents of data violations. In case of a data breach, certain regulations will impose exorbitant fines, and amounts will be charged from the company. Not only that, but the organizations may also lose their stakeholders' trustworthiness and credibility, which may lead to loss of employer branding [10].

Though organizations strive to maintain harmonious workplace through policies and

The purpose of this study is to ensure the human resource professionals' commitment towards data protection in Business Process Management (BPM) industry. BPM organizations are all about managing someone else's business process. In this kind of organization, the human resource department is not only responsible to ensure the data protection of their employees but also to make sure their employees safely manage clients' and end-user data.

II. LITERATURE REVIEW

Today's rapidly changing data landscape has led to the necessity for proper data protection on storing, managing, retrieving, and disseminating data from 'good to have' to 'must-have' with utmost importance. Data protection regulations need to ensure

employee data protection for a harmonious workplace [11]. It will make sure the organization is progressing towards the right path establishing the security of such data through proper standards and policies.

Personal data can be defined as “any information that can identify a data subject directly or indirectly, by reference to an identifier such as a name, an identification number, location data or an online identifier, or one or more factors specific to the physical, physiological, genetic, psychological, economic, cultural or social identity of that individual or natural [1]. Further, personal data could be collected only for a specific purpose and not for any other purpose.

Data protection is the process of protecting essential information from corruption, compromise, or loss of data [7]. For instance, the information in which employees hesitate to communicate with third parties such as race or ethnic information, sexual orientation, relationship issues, and political interest [8]. Said information is treated as highly sensitive data where everyone hesitates to share among others. Yet due to information technology, the amount of data gathered and stored is drastically increasing day by day, important to protect those data increases. There are many negative consequences if we fail to protect highly sensitive personal data, including financial losses and poor employer brand. There was a lot of controversy over Facebook and the Cambridge Analytica data breach [3]. Many people have started talking about data privacy and data protection. People have explored what are the actions they could take against the breach of data privacy from the organization's point of view and what are the remedies available for them to seek assistance in such a scenario. Many companies have started updating their company data privacy guidelines and a lot of updates were available for the general public when they access websites of such companies. Identifying the importance of data protection, the European Union (EU) has introduced the General Data Protection Regulation (GDPR) which is one of the most powerful legislatures ever introduced.

The GDPR was introduced to match data protection law across the EU and greatly increases responsibilities on controllers and processors of personal data. GDPR has a significant impact on the use of employee and candidate data in particular and as such, all employers should familiarize themselves with it. GDPR tries to protect data privacy across EU countries and even extended to other countries who are managing or storing data from EU countries with greater obligation and controls [5]. Even a country like Sri Lanka is under such laws if the data processing or controlling of EU countries is done from a Sri Lankan company.

1. The Importance of GDPR Regulations to Sri Lanka

With the increased interest of data privacy in both the local and global contexts, the topic has captured much attention from the general public as well as statutory bodies. Despite being compliant with such different data protection laws, there should be a moral and ethical standard also when it comes to respecting the data privacy of individuals and the right to know of parties whose data are being used for various purposes. Generally, data protection would fall under the function of information technology or information security, whereas because of the nature of the data and policies which should be established across various functions in

the organizations, human resources also have to play a critical role to establish the required standards.

Sri Lanka has no legislation in place for data protection and privacy legislation. Though Sri Lanka not introduced any legislative coverage over personal data protection [4] nor has recognized the individual data protection is a fundamental right of Sri Lankan citizens there are certain pieces of statutes support data privacy [4]. This can be considered as a major step towards the protection of data.

2. Human Resource Professional's Commitment to Data Protection

Human resource professionals handle essential human resource tasks such as recruitment, performance management, learning and development, reward management, discipline management, grievance handling, and industrial relations [7]. In BPM organizations, there are separate legal and information technology professionals to ensure data protection. However, the issue of non-compliance to data protection cannot be marked as the sole responsibility of the legal and information technology teams but also the HR professionals carry a lot of weight to ensure there are right actions have been taken to ensure the compliance towards data protection. The compliance is highly challenging to such laws, especially to the laws such as GDPR due to the lack of regulatory support. However, as HR professional there are certain key action should be taken to establish a company with rigid compliance for data protection laws.

Business process management companies are performing outsourcing work for EU countries. If any country works for these countries, it should adhere to data protection regulations. Especially the businesses such as Business Process Management (BPM) and Knowledge Process Management (KPM) who are directly impacted by said law and potentially liable for skyrocketing fines for data breaches. Breach of individual privacy data not only results in exorbitant fines but also to the loss of foreign clients and survival of businesses who are operating in BPM/KPM domains in Sri Lanka. Human resource professionals have access to certain personal data that can be freely available not only for the respective custodians but also to the wider group of people who are in the same department [11]. It is difficult to track who possesses which data if an individual wants to ensure the privacy of their data. Therefore, employees may feel less protection over their data privacy.

Being compliant with data protection regulations would increase the trust and reputation of the organization with the customers and the general public. More awareness and pieces of training on compliance is required to be knowledgeable on the data protection. Increase usage of cybersecurity measures has minimized the threat of data breaches [9]. With increased controls over data protection, certain data access is given to a few individuals even within the human resources department. As the data that the organization holds streamlined, the IT systems may be more effectively used.

Apart from the positive impacts, there are certain negative impacts of data protection regulations on human resources. Human resources would be in great pressure to ensure the safety of the data privacy in the organization at all times without any security breach. Organizations should request for personal data only if it's required and should ensure the removal of such data if not required. When I am conducting interviews with human resource

professionals in the industry, the majority mentions that there is no deletion of personal records from the company. It will remain with the company for a longer period they exit from the company. Which is a controversy for the GDPR? Further, it is always good to have explicit consent from the parties who are shared the data. Seeking specific consent from employers might place human resources in additional pressure on human resources [10]. On the other hand, employees are also under pressure to make sure that personal data are accurate and report if there is a breach within 72 hours [6]. Data protection processes should be designed and shared throughout the organization. Data protection by design ensures that knowledgeable employees are given the task to process personal data [6].

The employees who are processing data should be supported with the right tools and software which will ensure the data integrity in

III. METHODOLOGY

This study focuses on the issues of individual data privacy breaches and being non-compliant to various data protection regulations in both local and global companies and human resources responsibility to make it compliant. Though data privacy might apply to many industries, this study gives special reference to the BPM industry which is one of the main industries which liaise with data processing and data managing. Another important aspect of being in the business process management industry is that company has to be compliant with a lot of strict foreign data protection regularities such as GDPR in the European Union (EU) where data breach would cost extremely high fines.

This study is predominantly designed as a qualitative study based on the constructivist paradigm, to identify the role of human resource professionals in ensuring data protection. The study attracted respondents from a variety of different backgrounds as human resource professionals and employees who works in the BPM industry. In this study, both human resource professionals and other employees' perspectives on data protection were considered.

Both Primary and Secondary data has been utilized in the current study. Primary data has been collected through one to one interviews with the target group of six human resource professionals in the BPM industry.

Table 4.1: Respondent Demographics

Respondent	Company	Position	Age
1	A	Manager – HR	38
2	B	Group Manager – HR	36
3	C	Deputy Manager - Learning	32
4	D	General Manager – HR	45
5	A	HR Executive – HR	29
6	C	Recruitment Analysis - HR	26

Source: Personal Interview Data (2020)

the organization. The cost of such investments would be comparatively higher. In case of any breach in data protection, organizations would have to pay extremely high prices as fines. The time of protecting data and other related processes would increase the workload of the employees and it will take more time to complete the allocated tasks. Training is a vital element of grooming employees to become better. When an organization pursuing a journey of establishing a data protection culture, without even knowing, the company might go to an extreme level of arranging more pieces of training. However, extensive pieces of training may bring negative impacts to the organizations compared to the benefits. There could be instances where certain pieces of training could be irrelevant. Then employees might not take these pieces of training seriously and positively.

Further forty employees were interviewed through two equal focus group interviews to understand the perception of human resources professionals' commitments towards individual data protection. Moreover, Secondary data was extracted from internal policies, newspaper articles, researches, and websites. Secondary sources including data policy and legal documents were used to understand the applicable law for data protection. Collected data was analyzed and represent graphically.

IV. DATA ANALYSIS AND DISCUSSION

BPM industry professionals stressed that they have proper ethics, policies, and regulations on data protection since they are serving global clients. There were six human resource professionals, all agreed that they have data protection policies and adhering to GDPR. Further, they are more concerned about storing personal data, processing, and disseminating among relevant parties.

Human resources professionals were given an adequate commitment to ensuring data protection and avoid any possible data breaches in the organization. The respective areas were availability of a data protection policy, access levels to the data, appropriate consent from employee or client, processes to support the data protection, keeping a track of security incidents, privacy by design in the systems, what actions to be taken during a data breach, mechanism of delete the data based on the request. The highest positive rating was received for the content of, *'Is access to data given on a need-to-know basis in your company?'*. This means that every company ensures that all staff is just not given access to all the data

Respondent 2 mentioned that there are precautions that we can take when we design the human resource information systems *"There are mechanisms that we can use to apply technology to resolve data protection issues"*. Most of the BPM organizations have standard consent papers when they collect information from employees and clients. This has been manifested as *"According to GDPR guidelines we need to provide consent papers when collecting personal data from relevant parties"* from respondent 1, 2, 4, 5, and 6.

"Data protection is paramount important to every organization now more than ever before. It's not only the IT department but the

communication and collaboration should be started from human resources professionals and steer the journey of becoming an organization where data protection is given utmost importance. Though there are multiple challenges, this cultural change is essential for any organization to survive in the future global competition.”

Participant 4

Data protection can ensure through proper encryption. Content analysis on encrypted data transmission, processes to support the data protection, keeping a track of security incidents, privacy by design in the systems, and mechanism of delete the data based on the request were received doubtful feedback. On the other hand, questions on access to data given on a need-to-know basis, encrypted data transmission, processes to support the data protection, have received zero negative feedback. It means most of the organizations have those security checks in place towards data privacy. Finally, the areas organizations need to give focus on are sensitive data encrypted especially during transferring and storing and updating privacy notices and privacy policies. Both these areas have been rated negatively as 56% each with ‘no’ answer.

Organizations take many precautions to ensure individual data protection. Though BPM organizations ensure data protection, based on the focus group interviews, employees feel their data is unprotected. Based on the focus group interviews, employees' trust in the commitment of the human resources towards ensuring data protection and data processors in the organization are sound with their responsibilities on data privacy. Employees were doubtful data privacy up to a certain extend. Three-quarters of the participants were unaware of ‘Do you have a policy on data protection in your organization?’, ‘Do you have a ‘clean desk’ policy in your organization?’, and ‘Is there an identifiable person in your organization who is responsible for the data protection in your company?’. These doubtful answers imply that the staff is not aware of provisions available in their organizations about data privacy. All in all most of the employees who are working in the BPM industry are not positively answered and their responses indicate that there should be more awareness to be done on the subject of data protection.

V. CONCLUSION

The human resources role has constantly changed in recent years moving away from an administrative role in the past. The new trends in data protection and privacy laws. This study shows how ready Sri Lankan human resources professionals and what are the actions they should take in their respective areas to be compliant with data integrity and individual data privacy issues [11]. Employees feel more secure and protected when they know that the organization follows on the data protection principles and rules to protect their data.

Individual data security indirectly impacts to increase organizational performance, productivity. It creates a committed and long-term relationship with mutual trust and support between employee and employer in the long run. Further, human resource professionals need to work also in collaboration with other functions such as IT and risk management and legal teams,

opening a dialogue up with colleagues regarding data protection and embracing the appropriate technologies.

VI. RECOMMENDATIONS

One of the major concerns that employees have on data protection is whether the organization would delete the data after they exit from the company. Similarly, candidates are not sure how long would the organization would retain the data with them. Most of the human resources professionals are failed to address these concerns. Though there is a very organization that has a specific hiring policy that would state they will delete the candidate data after 6 months, none of the organizations confirmed the fact on employee data would be deleted after a particular period.

On the other hand, clients also have a valid concern about how long the organization would retain their data with the organizations. If an organization has a clear declaration that they would delete the data as per a data retention schedule and the mechanism of destroying such data, that would be a great plus point for the organizations to win the trust of candidates, employees, or clients.

This should be done in two-way communication. For employees, at the time of recruitment, they should be clearly informed on the reasons why the organization requires certain individual data and very clearly communicate all types of policies including data protection, privacy policy, data breach reporting policy, access control policy, and data retention policy. Also, they should be communicated on the changes to such policies and should obtain employee's consent.

The consent from employees or clients should not be ambiguous and general. It should be obtained specifically mentioning the reasons and should be specific in nature. Also, when obtaining consent there should be a mechanism for employees to request not to retain certain confidential data. For organizational benefit, employees should be given adequate pieces of training and awareness on data protection and cybersecurity breaches. This will help the organization to handle data privacy and data protection proactively. Another progressive step towards the data protection culture is appointing a specific person to handle data protection. Most of the large organizations would have a dedicated person purely for this reason.

Finally, the organizational information technology infrastructure should allow the organization to be compliant with the required regulatory standards. This includes system development with privacy by design method which ensures data protection from the system design stage. System security controls, maintaining system logs, and the latest security updates.

APPENDIX

Employers perspective on GDPR and human resource commitment

1. Do you have a data protection policy in your organization?
2. Is sensitive data encrypted during your organization especially during transferring and storing?
3. Is access to data given on a need-to-know basis in your

company?

4. Do you have the right level of consent from employees or clients?
5. Do you have processes in place to support data access requests?
6. Are you keeping a track of security incidents such as security violations, downtimes, and updates?
7. Do you incorporate 'privacy by design' into your IT systems?
8. Do you measure data protection compliance in your organization with global data privacy regulations?
9. Do we know what actions to be taken in an impactful security breach?
10. Have you recently updated your privacy notices and privacy policies?
11. Do you have a mechanism to delete data if requested by an employee or client to do so?

Employees perspective on GDPR and human resource commitment

1. Do you know about data protection regulations?
2. Do you have a policy on data protection in your organization?
3. Do you feel that HR ensures data security and privacy in your organization?
4. Do you know that organization needs to have your consent to obtain and store your personal information?
5. Do you think the staff who are processing data in your organization are thorough with their obligations towards data protection?

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The Use of Mobile Compilers for Learning Computer Programming in Higher Education Institutions: A Case of IAA and ATC

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Abstract- This study examined the use of mobile compilers for learning computer programming in higher education institutions (HEI) in Tanzania. The paper presents findings of the use of mobile compilers for learning computer programming conducted at Institute of Accountancy Arusha (IAA) and Arusha Technical College (ATC). The study used case study research design with a randomly selected sample of 170 computing undergraduate students who positively responded to questionnaire and became suitable for the study. The data collected was analysed and results were presented using descriptive statistics. The results of this study show that computing students use mobile apps for learning computer programming. However, results indicate that facilitators of the computer programming courses do not emphasize on the use of mobile compilers for learning and self-practice. The study also indicates that mobile compilers offer great benefits that allow students to learn computer programming using mobile technology.

Index Terms- Mobile compilers, mobile apps, computer programming, higher education, IAA

I. INTRODUCTION

The world is moving from traditional computing technology to mobile computing [1]. The invention of mobile devices, such as smartphones, tablets, and e-readers, has created new opportunities for the devices and mobile applications [2]. This means that the most activities performed on computers are now definitely performed on mobile devices. As a result, software developers are also engaging themselves in the development of mobile applications.

The availability of mobile applications, also known as 'apps', gives users flexibility on performing different activities on mobile devices in everyday life. There are personal and professional mobile apps that can be used for leisure as well as promoting business. There are several categories of mobile apps for business, communication, education, entertainment, games, finance, maps and navigation, music, photography, shopping, sports, video players, and weather.

The use of mobile apps in education provides an opportunity for instructors and students to improve teaching and learning inside and outside of the classroom [3]. This means the apps can make it easier for instructors to change the traditional teaching methodologies to the digital learning using mobile devices. As a result, students will be more engaged in mobile learning that improves participation and learning experience [4].

This study aimed at examining how HEI students use mobile compilers for learning computer programming courses. The study looked into the extent to which computing students are familiar with the use of mobile compilers in computer programming, mobile compilers usage for learning computer programming, and benefits of the mobile compilers as learning tool.

II. LITERATURE REVIEW

The use of mobile devices and mobile apps in education has increasingly gained popularity over recent years. The impact of these smart gadgets and the apps cannot go unnoticed in the modern world for both instructors and students. [3] argued that educators from all disciplines have to adopt the use of mobile devices and mobile apps as instructional resource. Additionally, the devices and apps are the centre of mobile learning which provides flexibility for students to learn anywhere, anytime [5].

Mobile Apps in Education

According to [3], mobile apps have penetrated and become available in academics. The use of the apps in education has been accepted by students and paved a new way for instructors to engage them with more learning activities. Mobile apps have improved ways of delivering teaching and learning, communication, assessments, and participation in learning activities. Fully engaged students are likely to complete their undergraduate studies and even continue with postgraduate studies [6].

The use of mobile apps in higher education has created a new platform for learning known as mobile learning [7]. In the study conducted by [7] demonstrated that mobile learning improves learning by facilitating communication that extends outside the

classroom between instructors and students (60%), students with other students (65%). Moreover, the study observed the use of mobile apps makes it easier to access coursework (72%) and increases the motivation to complete coursework (42%). Despite the benefits that mobile apps offer, the study proposed that students and instructors require technical, logistical, and pedagogical support for integrating mobile apps in education.

Research study in emotions and continued usage of mobile apps found that students are motivated to use mobile apps in their studies due to positive emotions and enjoyment [8]. Their research concluded that positive emotion is influenced by perception of benefits offered by mobile apps. Also, the element of the enjoyment in the use of the mobile apps improves participation and engagement of students in learning process [9]. The study underpins the fact that mobile apps are very important in education sector as mobile technology continues to draw attention from every field.

The use of social media apps has positively affected the education field [10]. Social media apps provide instructors and students with ability for sharing, exchanging, commenting, discussing and creating information and knowledge in a collaborative environment [11]. The freedom of expression provided by the social media in learning groups can significantly improve the learning process. It was observed that most of instructors have used a social media in a class session [12]. This study also suggested that social media apps can be used as a teaching tool in higher education.

Mobile Compilers

Compiler is a software program which converts high-level language programs into machine language [13]. Therefore, a mobile compiler can be defined as a compiler installed on mobile device that converts high-level language source codes into machine codes. It provides source code editor, compiler, debugger and other programming utilities which can be used to compile, run and debug programs on mobile devices. With mobile compilers, students can write, compile and run programs without a laptop or desktop computer anytime, anywhere and on the movement [14].

Like other apps, mobile compilers are available in app stores [15]. These compilers are available as open source while others are commercially offered. Mobile users using different platforms, such as Android, iOS, and Windows Phone, can download mobile compilers from the dedicated app stores and install them on their devices [16].

Mobile compilers can operate in offline or online mode [17]. An offline mobile compiler allows coding in source code editor without connection to the Internet. An example of the offline mobile compiler is CppDroid. One of the main advantages of offline mobile compiler over online is that mobile users are able to code all day as long as device's battery is not down. An example of C++ program and its output in CppDroid offline mobile compiler for Android is shown in Figure 1 and Figure 2 respectively.

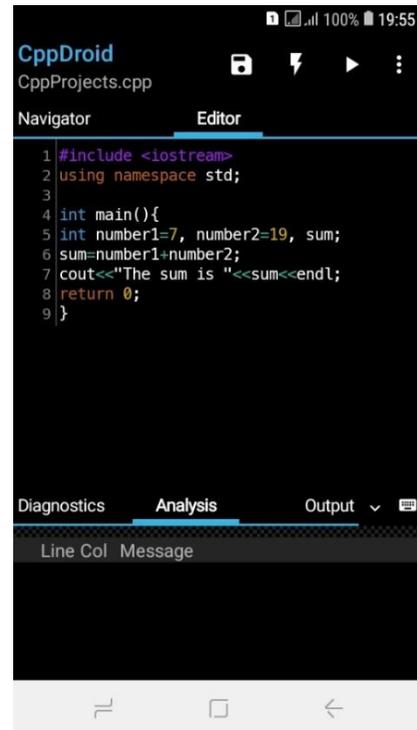


Figure 1: C++ program written in CppDroid for Android

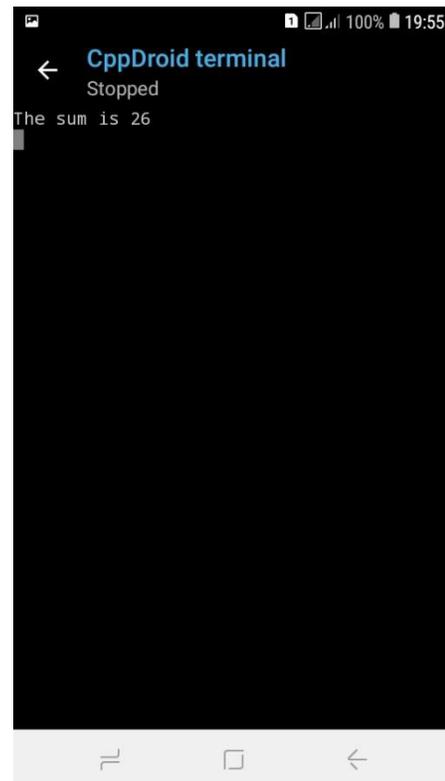


Figure 2: Output of C++ program written in CppDroid for Android

Contrarily, an online mobile compiler requires an Internet connection to write, compile, run, and debug programs. When a mobile device is not connected to the Wi-Fi or the data mode is

switched off, the mobile compiler is not available. Online mobile compilers use cloud computing by providing convenient tools that allow programmers to compile source code and execute it in online storage [18, 19]. One of the main advantages of the online mobile compiler is that no environment configuration is required to set it up. DCode is a good example of an online mobile compiler. Figure 3 shows an example of Java application and its output on the same screen in DCode online mobile compiler for Android.

```

1 import java.util.*;
2
3 /* the program computes and prints the
4 of two numbers */
5
6 public class Sum{
7     public static void main(String args[]){
8         int number1=7, number2=19, sum;
9         sum=number1+number2;
10        System.out.println("The sum is "+sum);
11    }
12 }
    
```

The sum is 26
Process finished.

Figure 3: Java application written in DCode for Android

Research Gap

Several studies have been conducted in mobile technology. The use of mobile devices and associated mobile apps has also been studied almost in every field, such as health, business, agriculture, research, and education. However, there are limited studies concerning mobile compilers for learning computer programming in Tanzania's HEIs. This study attempts to fill this gap by conducting the study in the use of mobile compilers for learning computer programming in HEIs in Tanzania.

III. RESEARCH METHODOLOGY

The Study Area, Target population and Sample Size

A case study research design was used in this study because it provided an opportunity for a thorough and in-depth examination of the use of mobile compilers for learning programming [20]. The two colleges, IAA and ATC, were selected to represent higher learning institutions. The reason for choosing these colleges was that they offer similar computing programmes and are both located in Arusha, Tanzania. The targeted population was computing undergraduate students with at least one

programming language skills enrolled in computer science and information technology programmes.

Simple random sampling technique was used to determine the sample size. It is a probability sampling which ensures that every member in the population has an equal chance to be included in the sample [21]. A sample size of the 194 participants was selected from the target population.

Data Collection

This study used an online questionnaire as a method of data collection. The questionnaire was designed using Google Forms and mailed to a sample of 194 respondents. In addition, the questionnaire's link was shared in students' WhatsApp groups to ensure that the respondents are conveniently reached. 170 respondents carefully filled in the questionnaire and became suitable for the study. Therefore, the response rate was 87.6%. The researcher chose questionnaire because it allowed quick and easy collection, and analysis of data. Furthermore, the researcher opted online questionnaire as a precaution to protect researcher and respondents from the spread of COVID-19 [22].

Data Analysis

The data obtained from the questionnaire were analysed using descriptive statistics. Descriptive statistics "are used to describe the data collected in research studies and to accurately characterize the variables under observation within a specific sample" [23]. The researcher opted for descriptive statistics because they present quantitative descriptions in manageable format. A frequency distribution was used to organise and summarise the research data so that they can be analysed and interpreted easily [23].

IV. FINDINGS AND DISCUSSION

Demographic Characteristics of Respondents

This research study involved 170 respondents from the computer science and information technology undergraduate programmes with an experience of at least one programming language. 81.2% of the respondents were males while females were 18.8%. The majority of the respondents were aged between 22 and 29 as they constituted 79.4%, while 14.7% fell into an age group of 14 to 21, and 5.9% was shared among remaining age groups. No respondent was above 45 years old. Furthermore, a greater number of the respondents, 81.2%, were bachelor students while 18.8% were diploma students. Table 1 summarises the characteristics of the respondents.

Table 1: Characteristics of Respondents

Gender	Frequency (Fr)	Percentage (%)
Male	138	81.2
Female	32	18.8
Total	170	100
Age Groups		
14 - 21	25	14.7
22 - 29	135	79.4
30 - 37	7	4.1

38 - 45	3	1.8
Above 45	0	0
Total	170	100
Program		
Diploma	32	18.8
Bachelor	138	81.2
Total	170	100

As Table 1 illustrates, the findings revealed that the majority of the respondents were bachelor students. To greater extent, students enrolled in bachelor programmes have more programming skills than those enrolled in diploma. Therefore, this study generalised that respondents were a great representation of the target population. In addition, the study revealed the gender imbalance between male and female respondents. The number of male respondents was extremely higher than the number of female respondents. This larger gender gap is directly related to the fact that the number of male students enrolled in computer science and information technology programmes is higher than the number of female students.

Mobile Compilers Usage for Learning Programming

In examining the usage of mobile compilers, respondents were asked different questions about the use of using mobile compilers for learning computer programming. Using a 5-point Likert scale from "strongly agree" to "strongly disagree", students were required to select the statement depending on their feelings about mobile compilers.

The respondents were asked if they were familiar with mobile compilers usage for learning computer programming, 59.4% agreed or strongly agreed that they were familiar with the mobile compilers. On the other hand, 21.8% of the respondents disagreed or strongly disagreed that they were not familiar with the mobile compilers.

The use of mobile compilers was also asked to assess if respondents use them for learning computer programming courses. The study indicated that 50.6% of the respondents agreed or strongly agreed that they used mobile compilers while 33.5% disagreed or strongly disagreed to use mobile compilers.

The respondents were also asked whether they spent more time coding on mobile devices than on laboratory computers. The results revealed that 41.7% of respondents agreed or strongly agreed to spend more time to code on mobiles than on laboratory computers while 42.9% disagreed or strongly disagreed on the same question.

This study also observed that 34.7% of the respondents agreed or strongly agreed that lecturers included mobile compilers as learning tools in course outlines or in teaching plan for programming courses while 43% disagreed or strongly disagreed on the same question. Moreover, 22.4% of the respondents remained neutral on the question.

The response to encouragement from lecturers to use mobile compilers for learning programming courses was that 39.4% of

the respondents agreed or strongly agreed. On the other side, 40% disagreed or strongly disagreed. Also, 20.6% of the respondents stayed neutral on the same response. Table 2 shows the summary of mobile compilers usage for learning computer programming.

Table 2: Mobile Compilers Usage for Learning Programming

	SA		A		N		D		SD	
	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%
I am familiar with the mobile compilers for learning programming	44	25.9	57	33.5	32	18.8	19	11.2	18	10.6
I use mobile compilers to learn programming	34	20.0	52	30.6	27	15.9	35	20.6	22	12.9
I practise more on my mobile device than on lab computers	31	18.2	40	23.5	26	15.3	47	27.6	26	15.3
Lecturers include mobile compilers as learning tool in course outlines/teaching plans	20	11.8	39	22.9	38	22.4	35	20.6	38	22.4
Lecturers encourage using mobile compilers to learn programming	24	14.1	43	25.3	35	20.6	33	19.4	35	20.6

Benefits of the Mobile Compilers

A larger percentage of the respondents, 67%, agreed or strongly agreed that mobile compilers improved their knowledge in studies while 20.6% disagreed or strongly disagreed on the same question.

The study also indicated that the majority of respondents, 69.4%, agreed or strongly agreed that mobile compilers provided flexibility that allowed them to code anywhere, anytime and on the go. On the other hand, 18.2% of the respondents disagreed or strongly disagreed showing that they never experienced the flexibility of the mobile compilers.

The respondents were also asked if coding on mobile compilers provided enjoyment to them. A good number of respondents, 59.4%, agreed or strongly agreed with this question. However, 21.8% of the respondents disagreed or strongly disagreed that enjoyment was not felt when coding on their mobile devices.

The response to mobile compilers increase student's participation in learning computer programming showed that 67.1% agreed or strongly agreed while 17% emerged against the statement by disagreeing or strongly disagreeing.

The study also indicated that the majority of respondents, 66.5%, agreed or strongly agreed that mobile compilers motivated them to do self-study in computer programming courses. Contrary to the majority, 18.2% disagreed or strongly disagreed on the same

statement. Table 3 indicates the benefits of the mobile compilers in computer programming.

Table 3: Benefits of Mobile Compilers

	SA		A		N		D		SD	
	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%
Improves my programming knowledge in my studies	58	34.1	56	32.9	21	12.4	10	5.9	25	14.7
Provides flexibility as I can code anywhere, anytime and on the road	59	34.7	59	34.7	21	12.4	14	8.2	17	10.0
Provides enjoyment coding on my mobile device	45	26.5	56	32.9	32	18.8	18	10.6	19	11.2
Increases my participation in learning programming	53	31.2	61	35.9	27	15.9	16	9.4	13	7.6
Motivates me to do self-study in programming	67	39.4	46	27.1	26	15.3	13	7.6	18	10.6

The use of mobile compilers has positive impacts on students for learning computer programming. The results of this study indicate that most students are familiar with use of mobile compilers. These results are in line with previous study which suggests that awareness of students on use of ICT tools for learning is very high and students have some necessary skills to use these tools for learning purposes [24].

Meanwhile, this study highlights that mobile learning has not dominated the use of computers for learning computer programming as students still code more on computers than on mobile devices. It is true that the number of mobile devices is outperforming computers but there are still no signs that they will completely dominate the use of computers in learning computer programming.

The availability of useful mobile apps for facilitating students' learning is one thing, the other is emphasis on use by instructors. The results suggest that the most instructors do not include mobile compilers in programming course outline or teaching plan documents. In addition, the most instructors do not motivate students to use mobile compilers as learning tool in computer programming courses. It is the duty of instructors to use all ways and means, including available mobile compilers, to make learning of computer programming easy [25].

The use of mobile compilers for learning computer programming brings great benefits to students. Mobile compilers improve students' programming skills in the field of study. This finding is consistent with study conducted by [7] that states that one of the benefits of using mobile apps for academic purposes is increasing student's knowledge in the field of their study.

Furthermore, another benefit that mobile compiler provides is flexibility that allows students to code anytime, anywhere and on the movement. This result is supported by [5] as authors claim that mobile apps provide flexibility for students to learn anytime, anywhere. This means students can learn and practise programming skills on mobile devices at their own convenience rather than relying on college computers. Geographical location, timetable and laboratory rules for college computer laboratories may slow the learning process.

The results also suggest that mobile compilers offer the benefit of enjoyment. Enjoyment of students has direct impact on the way they absorb knowledge as stated by [3]. This means that the enjoyment may positively or negatively affect the learning process. If a student enjoys learning, the cognitive absorption is increased. Otherwise, the cognitive absorption is decreased.

In a similar way, the results claim that mobile compilers increase students' participation in learning programming. The study by [26] backs up this claim as it states that the use of mobile apps improves participation and encourages continuous learning. As a result, students actively engaged in coding on mobile devices are likely to improve their participation in learning programming as mobile compilers extend the learning experience beyond the traditional learning environment.

The results of this study show that mobile compilers motivate students to do self-study in computer programming courses. This benefit is in line with previous research that suggests that mobile apps can motivate people to engage in behaviours [27]. The self-study promotes independent study that engages students in learning and improves their performance [28]. Mobile compilers, like other education apps, motive self-study that allows students to learn computer programming from the comfort of their home, on the movement, on own time, and at own pace.

V. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study focused on examining the use of mobile compilers for learning computer programming in HEIs in Tanzania. The study concentrated on looking into computing undergraduate students' familiarity, usage, and benefits of the mobile compilers for learning computer programming. The results of this study show that computing students use mobile apps for learning computer programming. However, results indicate that facilitators of the computer programming courses do not emphasize on the use of mobile compilers for learning and self-practice. The study also indicates that mobile compilers offer great benefits that allow students to learn computer programming using mobile technology. These benefits are improved programming skills, increased flexibility, enjoyment, improved participation and self-study.

Recommendations

Based on the findings of this research, the author recommends that instructors should include a list of available compilers in a teaching plan document for learning particular programming language. The list should consist of traditional, online, and mobile compilers to ensure that students are aware of all

important programming tools before the teaching and learning process begins. This in fact will assist students to comprehend computer programming easily and at their convenience. Similarly, students are also recommended to use mobile compilers for learning and practice due to the benefits the compilers offer. Author also recommends that curriculum developers and policy makers should integrate mobile technology in the education to improve teaching and learning. The future research could be conducted in other education apps for improving teaching and learning of other areas of computer science and information technology.

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Psychological Influence of the Mass Media in the Political Sphere

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Abstract- The support of the mass media to public policy is conditioned by the existence of the determination of the policy makers themselves, at the highest level, to be receptive to the mediation of the media and their cohesion factor, in relation to policy makers, citizens' preferences. In that matter, this role of the mass media does not refer only to the pre-election or election processes in the society, but is long-term and generally present. In addition, it must be comprehensive, so that public opinion, more or less divided, especially in post-conflict societies, can be found at recognized points of encounter. These are issues where public opinion is at the highest possible level of unifying attitude.

Index Terms- Public, media, election, citizens, society.

I. INTRODUCTION

In order to shape public opinion, a bilateral approach to public opinion is necessary, while respecting its authenticity, credibility, and new communication and technological literacy.¹

If the perception of political reality is mainly realized through the mass media, then greater manipulation of public opinion is possible, because today the influence of the mass media on the political scene is really great, more precisely through the history of social development, it has never been greater, with a tendency to grow even higher in the future.²

II. PSYCHOLOGICAL INFLUENCE OF MEDIA ON DECISION MAKERS

Modern research on the influences of the mass media on the political agenda began during the 1930s, due to Hitler's and

Mussolini's efficient use of the media in spreading political propaganda. One of the first large studies on the mentioned topic was conducted, which resulted in the conclusion that the mass media have a relatively small influence on potential voters. Furthermore, other studies of the time found that propaganda content (in the form of films) failed in the task, to indoctrinate a wider audience.³

In the past few decades, the very role of the mass media in political life has essentially changed, that is transformed from the role of a passive transmitter of messages to an active political actor working in his own interest.⁴ Based on academic literature, we are now free to claim that the media today actively participate in public political discourse, shaping the agenda of the political discourse itself, and contribute to their preferences (preferences) and political attitudes themselves.⁵ Some authors are of the opinion that the rising "power" of the media has led to the so-called. new types of democracy, ie. media democracy, in which the media conditionally take over the political system, and that traditional political actors (politicians) conditionally "lose control" over the political process.⁶

Historically, if we look at the situation on this topic in the United States, we come to a conclusion that policy makers listen to a significant extent, public opinion. Legislators very often "incorporate" factors into public policy decisions, which are directly related to what the media discourse has emphasized. Namely, the media themselves are very often perceived as the so-called determinants of the political program because they are the ones who select topics (issues) worth publishing and thus "raise" the exposure of certain topics in public discourse.⁷ The framing of mentioned topics in the media influences the choice of issues that are in the public domain, as well as the way in which citizens perceive them.⁸ However, the relations between the media and

¹ Van Aelst, P., Walgrave, S. (2011). Minimal or massive? the political agenda-setting power of the mass media according to different methods. *International Journal of Press/Politics*.

² Howard, P. N. (2006). *New media campaigns and the managed citizen*. New York: Cambridge University Press.

³ Hovland, C.I., Lumsdaine, A.A., Sheffield, F.D. (1949). *Experiments on mass communication*. Studies in Social Psychology in World War II, Vol. III Princeton. NJ: Princeton University Press.

⁴ Iyengar, S., Simon, A. (1997). News coverage of the Gulf Crisis and Public Opinion. A study of Agenda Setting, Priming and Framing, in: Iyengar S., Reeves, R., *Do the Media Govern? Politicians, Voters and Reporters in America*. Thousand Oaks.

⁵ Bennett, W.L., Entman, R.M. (eds.) (2001): *Mediated Politics. Communication in the Future of Democracy*, Cambridge: Cambridge University Press.

⁶ Meyer, T. (with Hinchman L.) (2002). *Media Democracy: How the Media Colonise Politics*. Cambridge: Polity.

⁷ McCombs, M. (2004). *Setting the Agenda: The Mass Media and Public Opinion*. Malden, MA: Blackwell Publishing Inc.

⁸ Brossard D., Nisbet M.C., (2007). Deference to Scientific Authority Among a Low Information Public: Understanding U.S. Opinion on Agricultural Biotechnology, *International Journal of Public Opinion Research*, Volume 19, Issue 1. Retrieved March 11th, 2019. from: <https://doi.org/10.1093/ijpor/edl003>

political decisions are almost always complementary, because the media pay attention to the interests, and thus to the demands of their "consumers"⁹, and very often force topics of a sensationalist nature that intrigue the public.

Research focusing on the relationship between the community and public policy and the role of the media in this relationship examines a number of parameters over longer time intervals. Most of the mentioned research uses the so-called statistical techniques to determine certain patterns. For example, analyzes of presidential elections (including campaigns) in the United States (1992 and 2000) show that media agendas as well as public agendas have had a significant impact on shaping the agendas of presidential candidates.¹⁰ The academic community came up with almost identical results by analyzing evening shows and their content in the period from 1984 to 1994 in relation to foreign policy in the United States, and the conclusion is that media coverage in the field of foreign policy has influenced presidential agendas in relation to with foreign policy.¹¹

Gosenbach, conducting analyzes of a similar type as mentioned, found that public opinion regarding the drug problem significantly influenced media coverage, which as a reversible process influenced the shaping of presidential agendas on drug control in the period from 1984 to 1991. Tan and Weaver studied the correlation between public opinion, the media themselves and political agendas based on various political topics. The results showed that all three mentioned components are causally consequentially related. However, the media and political agendas are the most closely linked. Furthermore, the academic literature proves that politicians often listen to the feelings of voters, and that the media themselves are responsible for the very "shaping" of these feelings. In accordance with the above, the literature of the academic type indicates a growing connection between the media and the political agenda¹², with an emphasis on the fact that politicians first "consult" the media in order to "scan" the situation among voters.¹³

Namely, the mass media as an instrument for creating public policy comes from the fact that the media themselves "shape" public opinion, and thus crucially influence politicians and thus encourage them to adequately respond to this challenge. In the United States, a study was conducted by the Page and Shapiro tandem, which confirmed that the mass media play an important role in shaping citizens' issues, thus significantly influencing political decision-making in the United States. Bretschneider, in Germany, came to an almost identical finding.

Politicians should almost always take into account the sentiment of citizens and incorporate the above into their political decisions. In the psychological sense, the media are the instruments through which policies are shaped in the modern social community.¹⁴ Politicians themselves, as decision makers and creators in a society, are ultimately the consumers of the media themselves and as such can be affected by the way the media report on current topics.

Based on the topic of gun control in the United States¹⁵, they came to the conclusion that the political moves made by the holders of political power were just shaped by the media. Herbst went a step further in his research, he believes that politicians perceive media reporting as a kind of shortcut to public opinion, and therefore consider it more important than the public opinion research itself.

Baumgartner and Jones,¹⁶ using a very rich database on the relationship between the media and political agenda in the field of public policy, came to convincing evidence that the media really influences on course of creating a political-type agenda. In accordance with the mentioned authors, the holders of political power are focused on current and well-risky solutions as such, which would certainly have a far lower chance of implementation in environments that are less "saturated" with the media. Research conducted in the field of international politics fully supports the observations made. Since the beginning of the Gulf War (1991), academic students in the field of international relations have seen the upcoming changes in the role of the media when it comes to international relations, more precisely international conflicts. More precisely, according to the hypothesis of the so-called CNN effect, the more proactive role of the media when it comes to foreign policy is also guided by new communication instruments (on-line mass media) of the media industry.¹⁷

III. MEDIA INFLUENCE ON POLITICAL DECISION MAKERS FROM THE POINT OF VIEW OF COMMUNICATION AND POLITICAL SCIENCES

Political scientists have studied political agendas within the political system, primarily through the creation of agendas of a political nature, but also through the reasons for political changes and turbulence, which are most often not discussed in the mass media and debates.

When, within (ie from the angle) of political science, science itself deals with the study of the media, it is a completely

⁹ McCombs, M. (2004). *Setting the Agenda: The Mass Media and Public Opinion*. Malden, MA: Blackwell Publishing Inc.

¹⁰ McCombs, M. (2004). *Setting the Agenda: The Mass Media and Public Opinion*. Malden, MA: Blackwell Publishing Inc.

¹¹ G. C. Edwards, B. D. Wood. (1999). Who Influences Whom? The President, Congress, and the Media. *The American Political Science Review*. Vol. 93, No. 2.

¹² Jacobs L., Shapiro R., (2000). *Politicians don't pander: Political manipulation and the loss of democratic responsiveness*. Chicago. University of Chicago Press.

¹³ Jones, B.D., F.R. Baumgartner. (2005). *The Politics of Attention: How Government Prioritizes Problems*. Chicago: University of Chicago Press.

¹⁴ McCombs, M. (2004). *Setting the Agenda: The Mass Media and Public Opinion*. Malden, MA: Blackwell Publishing Inc.

¹⁵ Schnell, F., Terkildsen, N., Callaghan, K. (2000). Symbolism and social movements: How U.S. political debates are shaped and citizens' attitudes influenced by symbolic communiques. In C. DeLandsheer & O. Feldman (Eds.), *Beyond public speech and symbols: Explorations in the rhetoric of politicians and the media*. Westport, CT: Praeger.

¹⁶ Jones, B.D., F.R. Baumgartner. (2005). *The Politics of Attention: How Government Prioritizes Problems*. Chicago: University of Chicago Press.

¹⁷ Robinson, P. (2002). *The CNN Effect*. London: Routledge.

different vision from that of communicologists. Political scientists believe that there is a similarity between the attention that the media pays to politics (in a broader sense) and that which is essentially of a political nature (in a narrower sense). Namely, both are of an episodic character, and they only force certain issues, so that the other is ignored. Scientists see the mass media as indispensable within cyclical political processes, because they introduce both positive and negative information of a feedback character, following and adapting to the strengthening and weakening of the tensions of political activities. Such an approach seeks to deepen the study of the relations between political processes and the mass media, concentrating on the exchange of data between the two, and on their processing.

Communicologists are very interested in the impact that the size of the scope of the media coverage has on public opinion. They studied the genesis of public opinion, its evaluation and engagement. Communication experts claim that the influence of the mass media on the agenda is of an indisputable nature, because they insist on certain issues, extending the one that prefers public opinion.¹⁸ They deepen their studies in terms of answering whether or to what extent the updating of the media agenda is responsible for stronger public attitudes, as well as assessing or deciding within a number of political processes. They focus on the capacities as well as the content of public opinion exposure to media influence, when it comes to election marketing in television advertising, assessment of election candidates, voting, activity of politicians, which they want to show the crucial influence of mass media on decisions, desire to engage and perceptions in general. citizenship in relation to political issues / attitudes.¹⁹

There are attempts for fusion of political sciences and communication are more recent, but we must not overlook the importance of the mass media in the study of political systems, but in their institutional form, even less political processes in their entirety or public opinion. Namely, the mass media are constantly present within the political systems, while the relations between political institutions and political processes take place every day according to precisely determined rules. The mass media have institutional support, when it comes to processes of an organizational nature, and these are, above all, focusing on political actors from the ranks of the political elite, but also following the tastes of consumers.²⁰

Political processes are also affected by all events within the media, just as political processes are affected by relations within the subsystem, on a daily basis. That is why communicologists studied the same and their influence, and the influence of institutional "rules" on the origin of news, but also the impact that news has on public opinion. However, there are repercussions of institutional regulations on political processes,

which remain unclear. Today, political processes are hard to imagine without a whole series of feedback, in which the mass media have an irreplaceable role.²¹

Limited-scope studies on repercussions of information processes and rules imply maximum commitment. The question arises as to how much the political processes have been affected by all previous changes within the mass media (digitalization, day and night programs, online media programs), because the forms of communication between politicians and public opinion have also changed. This new role of the mass media, as an institutional and political factor, which goes beyond journalistic everyday life, should be considered.

In terms of a comparative study related to the mentioned topic, we will mention only a few examples, on which the influence of the media on decision makers can be seen very plastically. Influence that public opinion had on the last governor of Hong Kong, of British origin, which is closely related to the placed news, was revealed, which was determined through surveys conducted on a weekly basis. Namely, the mass media worked deliberately, in order to target the feedback of public opinion.²²

Influence of the mass media was revealed during the Israeli elections (on four occasions), where the media influence on the choice of voters, but also on the final results, was recognized. Also, the research dealt with the influence of the mass media on the referendum campaign in Denmark (on the occasion of the introduction of the new coin / euro). An attempt was made to find out how much influence it has on the assessment of Danish political leaders by public opinion. So, in addition to the currency change becoming more transparent thanks to the mass media, the impact is greater when it comes to evaluating politicians, the government and their opponents, thanks to that same campaign.²³

IV. CONCLUSION

Researchers are trying to expand their knowledge about relationship between public opinion and the mass media. Political science, on the other hand, is increasingly studying the role of the media in the "chaotic" relations of political processes.²⁴ However, one thing is certain, and that is that the mass media influence political processes as an instrument for feedback of a positive or negative character. Politicians can be influenced by the media as well as citizens, because ultimately politicians themselves are part of the same society as citizens, more precisely they use the media to create an image of society and the media themselves and shape their attitudes. This is almost the rule today, because politicians "consume" the media for hours every day.²⁵

¹⁸ McCombs, M., Shaw, D. (1972). The agenda-setting function of mass media. *Public Opinion Quarterly*, Vol. 36.

¹⁹ McCombs, M. (2004). *Setting the Agenda: The Mass Media and Public Opinion*. Malden, MA: Blackwell Publishing Inc.

²⁰ Boydston, A. E. (2013). *Making the news: Politics, the media, and agenda setting*. Chicago, IL: University of Chicago Press.

²¹ *Ibid*

²² Zhu, J-H. (1992). "Issue Competition and Attention Distraction: A Zero-Sum Theory of Agenda-Setting." *Journalism Quarterly*, Vol.69

²³ de Vreese, C. H. (2004). "The Effects of Strategic News on Political Cynicism, Issue Evaluations and Policy Support: A Two-Wave Experiment." *Mass Communication & Society* Vol.7.

²⁴ Kingdon, J. (1984): *Agendas, alternatives, and public policies*. Boston: Little, Brown and Company.

²⁵ Van Aelst, P., Walgrave, S. (2011). Minimal or massive? the political agenda-setting power of the mass media according to different methods. *International Journal of Press/Politics*.

On the other hand, it would be almost naive to perceive today's politicians as almost ordinary media consumers. Namely, politicians are, as a rule, educated people and as such they understand the media way of working.²⁶ Based on the above, we can say that the media is a kind of instrument that is politically relevant.

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²⁶ Davis, A., (2007). Investigating journalist influences on political issue agendas at Westminster.

Political Communication.

Spatiotemporal Characteristics of the Domestic Water Consumption Patterns and Related Issues in Sri Lanka

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Abstract- Water is essential for all sorts of growth and development of humankind, animal, and plant. One of the most important uses of water is for domestic purpose and it is the third-largest water consumer from total water consumption in the world. This study mainly explored the spatiotemporal patterns of domestic water consumption and related issues in semi-urban and rural areas. Primary data collection mainly conducted with a hundred (N=100) sample household questionnaires and sample households were selected based on main drinking water sources (groundwater and tap water) using a stratified random sampling method. Correlation, Kernel density, nearest neighbor analysis, and interpolation techniques were used to fulfill the main research objective of the study. All analyses carried out using ArcGIS 10.1 and Excel 2013 software. The study found 392 randomly distributed domestic groundwater wells for daily activities. In the wet season, most households (65%) using the groundwater for their daily purposes but in the dry season, most of them (51%) use the government water supply. The daily average water consumption of the study area is 119.44L per person per capita per day. Bathing, toilet, cloth washing, and cooking and washing dishes were identified as the higher water consumption activities around the study area. The amounts of water consumption by each activity were 31.54%, 24.2%, 23.66%, and 10.33% respectively. However, water consumption patterns can be changed due to income, the number of household members, age, and distance. Also, the Uneven distribution of drinking water sources, spatial and time-related issues, insufficient water storage facilities, water scarcity, poor water management were identified as major issues related to domestic water consumption in the study area. Finally, it is hoped that the results of the study would benefit the policy and planning executives in the study area in optimizing the existing water resources for sustainable development.

Keywords: Domestic Water Consumption, Spatiotemporal variability, ArcGIS 10.1, Water Supply

I. INTRODUCTION

Water plays a significant role in human life and it became a basic necessity for economic growth and better living standards. Apart from the rapid population growth, expansion in urbanization, industrialization, rising demand and falling supplies due to overexploitation and anthropogenic impacts remain some of the major challenges in the drinking water sector. Moreover, Water is essential for the growth and development of all species of humans, animals, and plants. The Earth's hydrosphere contains about 1.36 billion kilometers of water and 75 percent of the earth's surface is covered with water containing 97 percent salt and 3 percent freshwater. Only 1 percent of freshwater is available for human consumption (Ali and Tarfa, 2012).

One of the most important uses of water is for domestic purpose and it is the third-largest water consumer from total water consumption in the world after industry and agriculture. The World Health Organization (WHO) defines "domestic water as the water used for all domestic purposes, including drinking, bathing, and food preparation". Domestic water consumption can be partitioned into two types: indoor water use activities and outdoor water use activities. Indoor water use activities include drinking, cooking, hygiene (bathing, laundry, and cleaning), and outdoor water use includes car washing, kitchen gardens, livestock water, and yard cleaning (Al-Ahmady et al, 2011). Domestic Water varies according to the living conditions and daily activities of consumers in urban and rural areas (Mohammad and Sanaullah, 2017). The United Nations organization has predicted that the world population will increase by another two billion by 2030 (Postel, 2000). Furthermore, with urbanization because of the influx of people into urban centers and urban areas, more water is likely demanded for domestic purposes in those areas. Although increasing water demand is understood relative to the gradually increasing population, it is very difficult to quantify the increasing water demand due to the change in living conditions. And also, several studies have done globally have shown

various factors were significantly connected with determining the amount of domestic water use. Such as the number of household members, level of maintenance of water supply system, education, and age of household head, income, distance to the water source, type of water source, etc. (Keshavarzi & et al, 2006: Fan et al, 2013).

According to the world health organization (WHO), the minimum per capita daily water consumption is 150 Liters. At present, per capita, daily water consumption in many parts of Sri Lanka is less than 100 Liters (Singh & Turkiya, 2013). Also, about 42 percent of the world's population will not be able to meet their basic water needs by the year 2050. Water scarcity affects more than 1.1 billion people globally. It was estimated that one-fifth of the world's population lives in areas where there is not enough water to meet-all demands (Shan and et al, 2015). A further one of the world's population does not have access to clean drinking water. This will have a direct impact on developing countries like Sri Lanka (Hewagamage, 2016). Population growth, business activity, urban development, water pollution, climate change, and drought have led to increasing water shortages in many parts of the world. (Shan & et al. 2015). Therefore, water shortage is a common and prevalent issue in different countries, especially in developing countries.

At present, a significant increase in the domestic water consumption sector can be seen also in Sri Lanka with population growth and urbanization. Sri Lanka has been always fortunate in having abundant freshwater reserves. But the increasing population, overexploitation of surface water, and groundwater over the few decades have resulted in water scarcity in any region of the country. Therefore significance changes and patterns can be identified in the domestic water consumption sector in Sri Lanka as well.

Recent decades have seen many research-based on household water consumption all over the world. But the few analyses have done in Sri Lanka. However, the most recent researchers have done for the identification of activity based on household water consumption. Various studies from the whole world have been studied on household water consumption patterns. These studies have shown that domestic water consumption in households varies considerably according to the living standard of the different areas. Per capita, water use was found to be 83.17 liters per person per day in Bangladesh with a positive correlation with socio-economic factors such as income, household size, use of water pipes, quality of the houses, and e.c.t. (Al Amin et. al., 2011). Singth and Turkiya (2013) study household domestic water consumption

patterns in rural semi-arid village India were per capita water consumption stands at an average of 117 Liters. Per capita was found to be as high as 203 Liters per person per day in Harbin China with a correlation with some factors such as climate changes (dry and wet seasons), use equipment in water consumption, etc. (Tingyi Lu, 2007). Oyasanmi, (2018) has identified the patterns of household water consumption in different areas of the Koji State in Lokoja Metropolis as well as sources of water supply in the area.

In many studies that have been done in this regard have been studied on the water usage by different domestic water consumption sector. Oyasanmi, (2018) has identified the water used for washing clothes and bathing accounted for the largest quantity of household water consumption per day with 53 percent and 25 percent respectively of total daily water consumption. In India, Shaban and Sharma (2007) studied domestic water consumption patterns in seven major cities. This study was found out that at the household level, bathing is the highest amount of water consumption with about 28 percent of total domestic water consumption. Toilets 20 percent, washing clothes 18.6 percent and washing utensil 16.3 percent. In Bauchi metropolis, the pattern of domestic water consumption at the household level is bathing which accounts for 45 percent of total domestic water consumption. Flushing toilet (15%) and Muslim prayer (10%) have become the second and third largest water consumption (Istifanus, 2017).

Some studies have also attempted to study the water sources used for domestic water consumption. Oyasanmi, (2018) has identified a total of 30 percent of households depended on wells located in their land or neighboring houses. Also, in this study, the analysis revealed that per capita water consumption varied within different locations in the study area. Mohammad and Sanallah (2017) studies about the sources of water for domestic consumption and private tube wells (48.5%) and public hand pumps and neighbors (19.2%) have become the main water source for their daily activities. According to the results of the correlation analysis in this study indicated that water consumption was significantly correlated with household size, the age of household head, household income, availability of tap water, time to collect water, bathing time per month, and groundwater table.

Barreto, (1999) has surveyed the water profile of residential consumption, end uses of water and frequency, and mean flow rates in a sample of households located on the west side of the city of Sao Paulo. According to the results of this study, the consumption for each weekday of monitoring, Friday as the higher water consumption. The point

of water consumption that showed greater use was the shower with 13.9%.

However, considering some of the research that has been done, it showed that they have studied the various issues related to domestic water consumption. In most of the studies, urban areas were chosen as their research study area. But in this study, both semi-urban and rural areas were chosen as the study area. This researches also studied the changes in household water consumption between several administrative zones. However, the focus of this study was to identify the changes in household water consumption in a selected small administrative region. Furthermore, while the above studies focus on statistical analytical methods for data analysis, this study has focused both statistical and spatial analyses. Also, in contrast to those studies, this study focuses to identify the problems related to water consumption. In this way, it can be identified that there are some differences between the above-discussed studies and the current study.

The primary aim of the research investigation was to identify the spatiotemporal patterns of domestic water consumption and related problems in Dompe GN Division, Gampaha District. To achieve the

overall objectives, specific objectives formulated as; [1] identify the main water sources and their distribution patterns in the study area, [2] access the spatiotemporal patterns of domestic water consumption in the study area, [3] examine the problems in related with water consumption in the study area.

II. METHODOLOGY

Study area

In the study, Dompe GN Division was selected as a study area, Situated in Gampaha district, Western Province. Dompe GN Division extending 1.287Km² small area of Gampaha District located in the western part of Sri Lanka. It was located at the Latitude 6° 57' 31" N - 6° 56' 35" N of equator and Longitude 80° 4' 11" E - 80° 2' 57" E (Figure 1). Dompe GN Division Located at the wet Zone in Sri Lanka. The area lies at an altitude of 50 feet above mean sea level and it belongs to the Kelani River Basin. According to the secondary data were obtained from the Census and statistics department of Sri Lanka, groundwater sources (Shallow wells) became their main water resource for Drinking water.

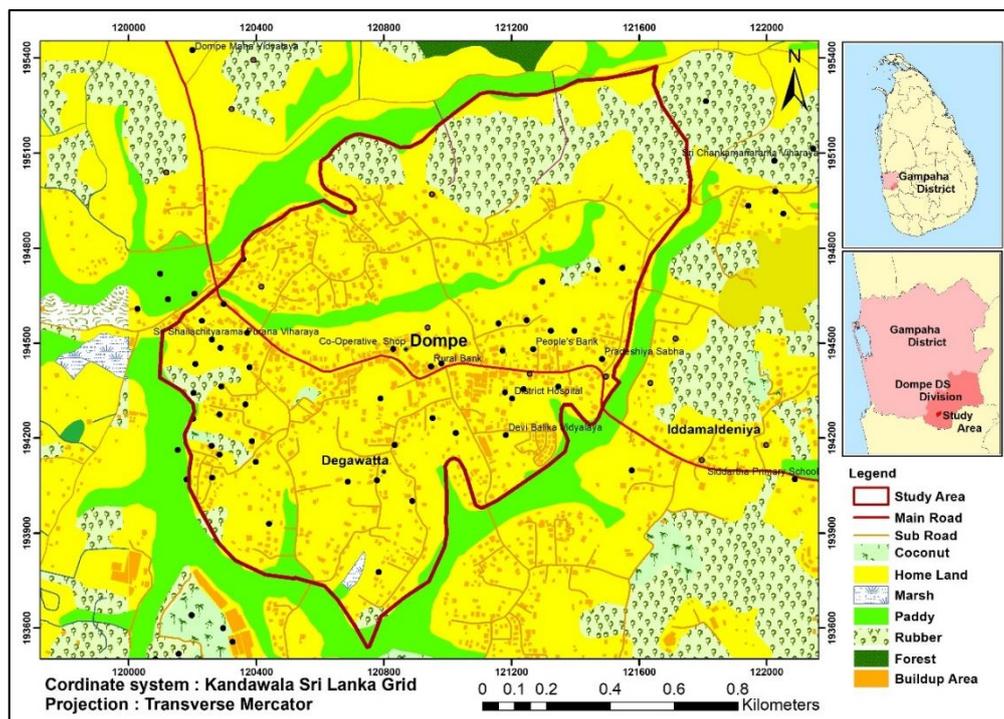


Figure 1: Study Area Map.

Data and Methods

Primary data were collected from July 2019 to January 2020 and mainly covered dry and wet seasons for data collection. Data collection mainly

conducted by hundred (N=100) sample household questionnaire and households selected based on main drinking water source (groundwater and tap water) using stratified random sampling method to collect data on quality of water, duration of water

usage, amount of water usage, type of water storage and water availability. Also, this survey obtained information on socio-economic and demographic factors such as income, number of household members, the age of household head, time to collect water, and the capacity of the container in which water is stored. A GPS survey carried out to identify the spatial locations of groundwater sources as well. Additionally, Semi-structured interviews also conducted in this research to identify the opinions of the people about domestic water issues and randomly selected ten officers and village leaders who are living in the study area.

Secondary data collection was also an important part of this study. Relevant secondary data were collected from the National Water Supply and Drainage Board, Department of Census and Statistics, and through the research papers and some useful literature.

Data Analysis

i. Spatial Distribution Pattern of Water Resources

Spatial Distribution of the domestic water resources was identified using spatial analysis tools in ArcGIS10.3. Average Nearest Neighbor Analysis was used to examine the distribution pattern of the water resources over the study area. The spatial density of the water resources was identified using Kernel Density Method and this analysis mainly estimated the density of water resources an entire dimensional study area, based on the known locations of discrete events. The density was calculated based on the centroid of each grid and Kernel function has used to interpolate the values over the study area.

ii. Characteristics and Pattern of Domestic Water Consumption

Indoor water consumption includes water used for bathing, toilet, cooking, drinking, washing, etc. were calculated to identify the characteristics of domestic water consumption. Daily basis per capita water consumption was calculated by each activity using the following equations (Equation 1 to 4). Concentric ring buffers were created from the main road and daily water consumption values were extracted to each ring to identify the pattern of the water resource distribution in the study area. Also, correlation analysis was used to assess the pattern of domestic water consumption and household income, the number of household members, age, and distance were used as major factors.

Equation 1:

*Daily water consumption for Bathing = Time for each use * Tap use frequency * Tap flow rate*

Equation 2:

*Daily water consumption for toilet = Toilet cistern volume/ Bucket volume * Number of flushes per day*

Equation 3

*Daily water consumption for cooking = Time of each use * Tap use frequency * Tap flow rate*

Equation 4

*Daily water consumption for washing clothes = (Time for tap use * Tap flow rate) or*

*(Washing machine water use = machine water consumption * number of uses)*

iii. Problems and Challenges of Domestic Water Use

Problem tree analysis was used to identify the existing problems and challenges based upon information on questionnaire survey and interviews. Also formulated the core problems, direct and indirect problems related to the domestic water consumption in the study area, and constructed a tree showing these relationships.

III. RESULTS AND DISCUSSION

Main water resources and their distribution patterns

The study survey found 392 domestic groundwater wells for daily activities and the Nearest Neighbor Analysis showed their random distribution patterns over the study area (Figure 2). The highest spatial density of the groundwater well in the study area is 2.968 and the lowest is 0.495 (Figure 3). Therefore, it can be identified that the groundwater wells of the study area have distributed unevenly. The ratio between groundwater resources and households in the study area can be identified as a 1: 2.34. Higher density areas scattered in the Western and Northwestern regions in the study area.

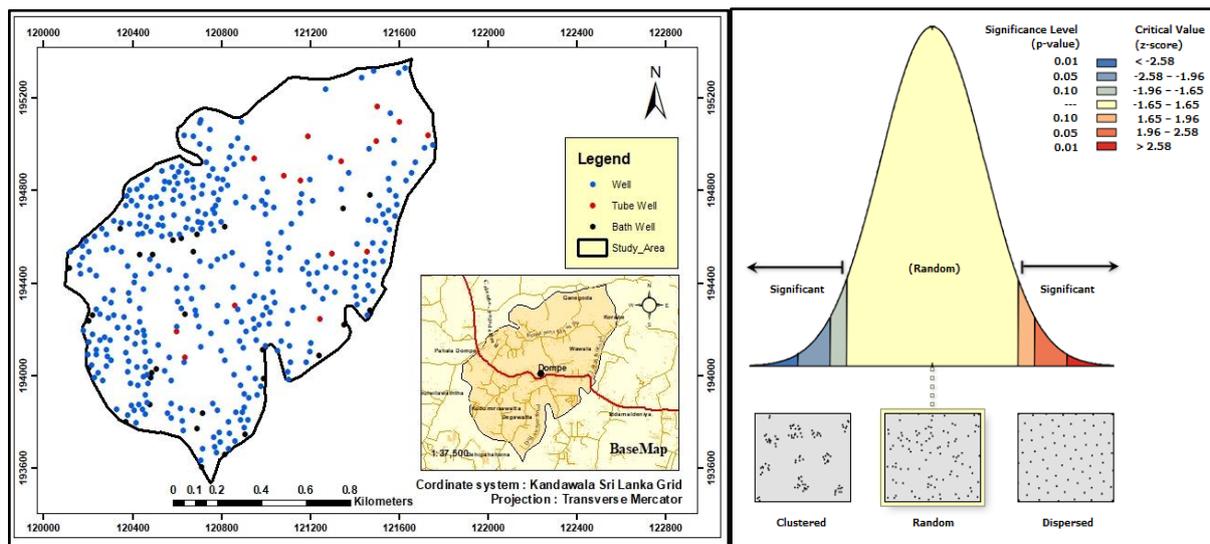


Figure 2: (a) Spatial Distribution of Groundwater Wells in the Study Area; (b) Spatial Distribution Pattern of the Groundwater Wells (Using Nearest Neighbor Analysis)

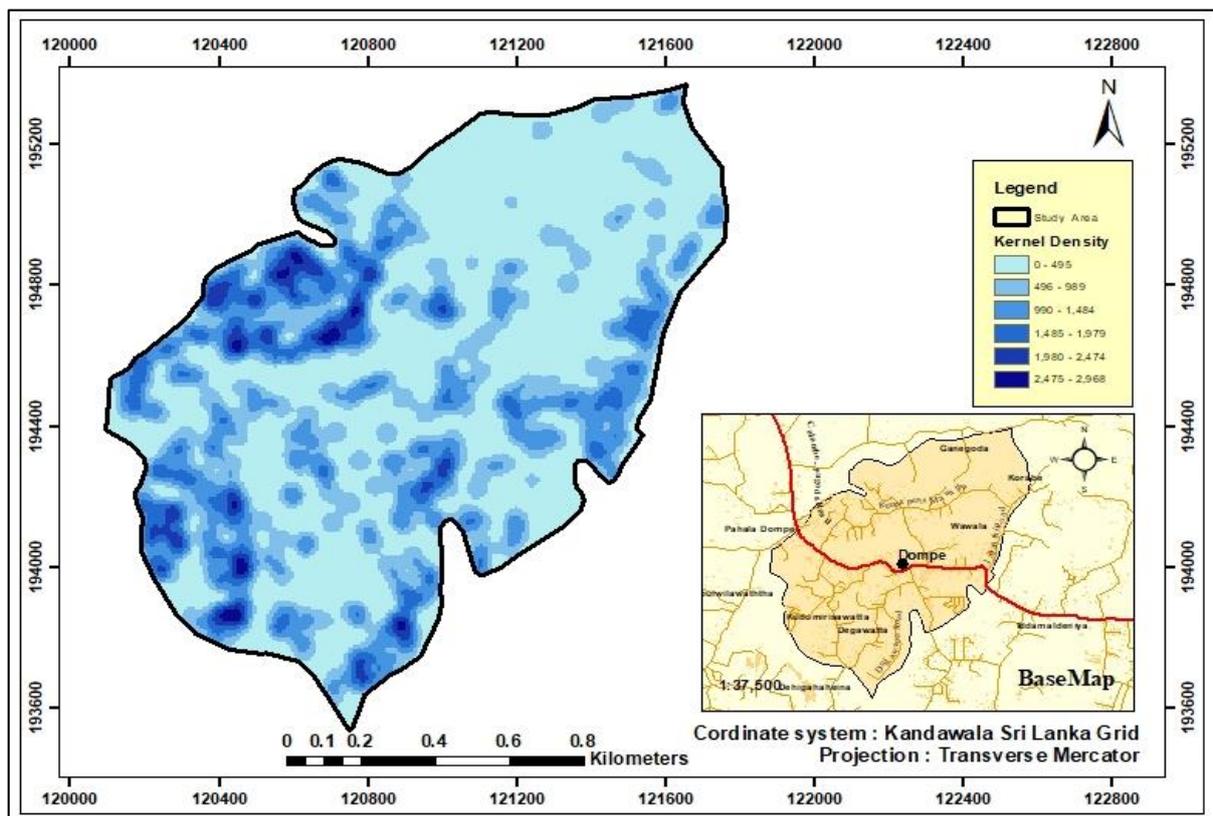


Figure 3: Spatial Density Map of Groundwater wells.

In the wet season, most households (65 percent) using groundwater resources for their daily activities. Such as shallow wells, deep wells, tube wells, etc. Furthermore, 35 percent of households

using the government water supply for their daily activities. But in the dry season, most of them (51 percent) used the government water supply for their daily activities (Table 1).

Table 1: Characteristics of Spatial Distribution of Groundwater Well

Water Source	Total Number of Wells	Percentage	Spatial Density
Shallow and Deep Wells	348	88.78	0.3795
Tube Wells	30	7.65	0.0327
Bath Wells	14	3.57	0.0153
Total	392	100	0.4272

Characteristics and Spatial Distribution Pattern of Domestic water Consumption

The daily average water consumption of the study area is 119.44L per person per capita per day. The minimum per capita daily water consumption is 84.10 Liters and the maximum per capita daily water consumption is 173.80 Liters (Table 2). There is a big difference between daily domestic water consumption in the area and different influencing factors can be identified, such as the number of

household members, age, occupation, income, etc. About 10 percent of households per capita daily water consumption exceeds 150 Liters and 83 percent of household per capita water consumption exceeds 100 Liters. But, about 17 percent of households have a per capita water consumption of fewer than 100 Liters. The average total water consumption of the household in the study area is 438.87L. Also, the minimum daily water consumption of a household can be identified as 130.90 Liters and the maximum as 890.80 Liters.

Table 2: Average water Consumption and Total water consumption per Household

Characteristics	Water Consumption per person per capita per day (Lpcd)	Total water consumption per Household per capita per day (Liters)
Mean	119.44	438.87
Standard Deviation	20.17	148.42
Minimum	84.1	130.9
Maximum	173.8	890.8

But when focusing on the special distribution of average water consumption per capita per day, it is possible to identify the differences in its distribution within the study area. The daily average water consumption of the area clearly shown that moving away from the main road, which depicts a lower value to higher value of domestic water consumption can be observed in the rural areas of the study area (Figure 4).

Water is used for various indoor purposes such as drinking, bathing, cloth washing, toilet, cooking,

domestic cleaning, etc. and outdoor activities such as garden watering, washing vehicle, livestock, etc. The pattern was bathing which consumes 31 percent of total domestic water use at the domestic level, Flushing toilet (24 percent), washing cloth (23 percent), cooking (10 percent), Drinking (2 percent) watering garden (3 percent) and so on. Bathing became the highest water usage activity in the study area. Figure 5 shown total daily water consumption by activity in the study area.

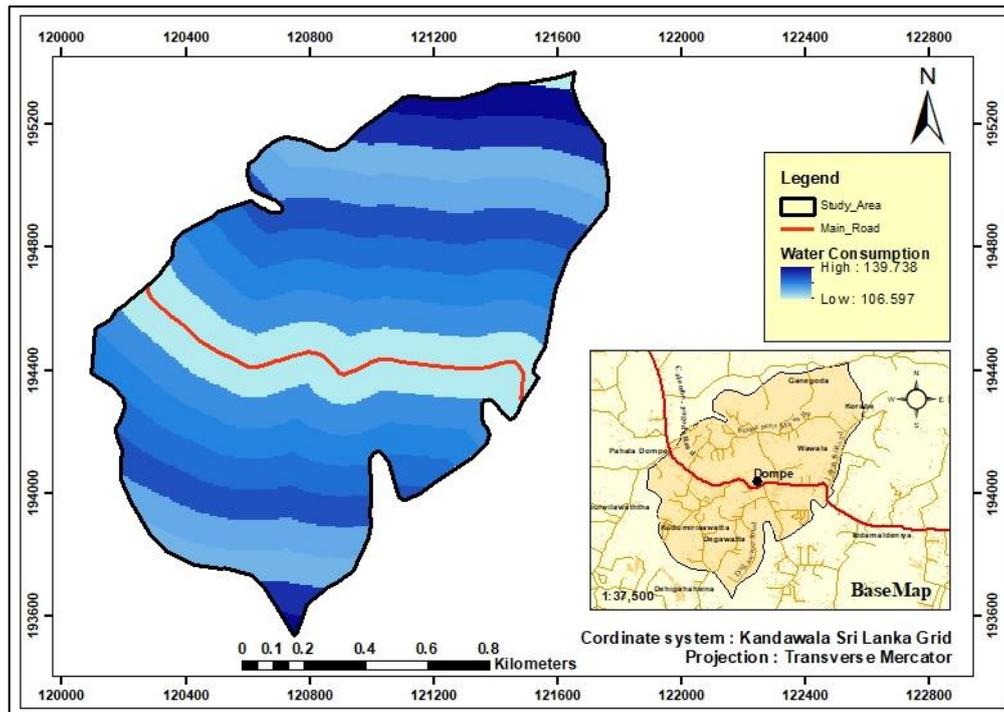


Figure 4: The Spatial Variability of Daily Average Water Consumption with Distance

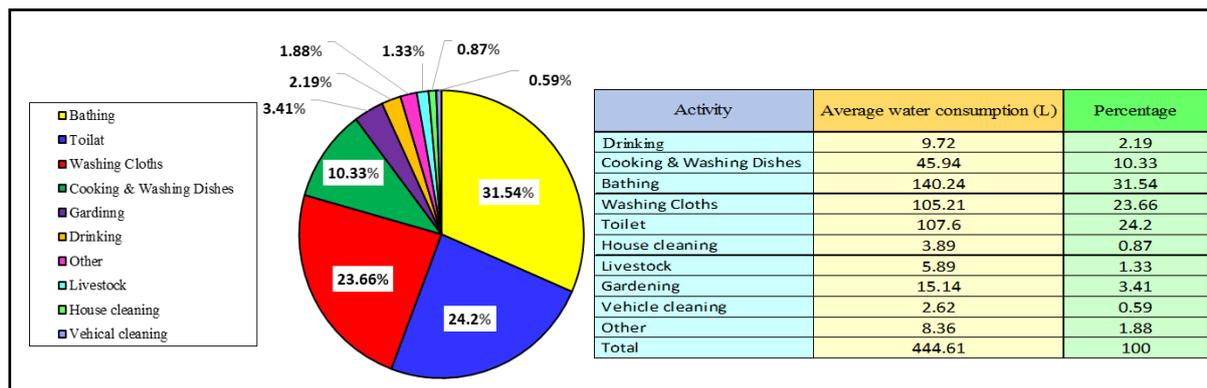


Figure 5: Total Daily Domestic Water Consumption by Each activity

Furthermore, several factors can be identified that affected domestic water consumption in the study area, and different influencing factors were analyzed. Monthly household income, the level of education of the head of household, the number of family members, and the capacity of the water storage tank have shown a positive significant correlation with daily domestic water consumption in the study area (Table 3). Pearson correlation analysis statistics show that the range of coefficients

is weak correlations (0.1-0.3), low correlation (0.3-0.5) a significant correlation (0.5-0.8) and high correlation (0.8-1.0). Among those factors, the number of household members ($R^2 = 0.90949$) and the capacity of the water storage tank ($R^2 = 0.83573$) were found out, have a high positive significant correlation with daily domestic water consumption. However, it was also found that factors such as time spent at home and the age of the household head have a negative correlation with daily domestic water consumption.

Table 3: Factors Influencing Domestic Water Consumption

Factor	Correlation coefficient
capacity of the tank	0.83573
number of family members	0.90949
household income	0.28051
age of the head of the household	-0.10656
level of education of the head of household	0.22175
time spent at home	-0.23336

Also, a questionnaire survey was consulted on their ideas on some of the existing domestic water consumption patterns in households. Accordingly, 73 percent of households said that water consumption has increased as the number of household members has increased. 38 percent of households was agreed that as the number of member's increases, the amount of water used for members was limited. About 56 percent of households agreed that water consumption increased as household income increase. With the decrement of water at the source during the dry season, 84 percent agreed that water consumption has limited.

Problems/Challenges of Domestic Water Consumption

A problem tree was created to identify the problems related to domestic water consumption in the study area. That focused on identifying the key problems related to domestic water consumption (Figure 6). Accordingly, six major issues of domestic water consumption were identified in the study area. Such as uneven distribution of domestic water resources, Spatial and Time-related problems, water-storing problems, Water scarcity, Water Management issues, Other Problems related to domestic water consumption.

The government water supply and groundwater resources can be identified as the main domestic water sources in the study area and as a result, many problems related to water supply and groundwater wells in the study area can be identified. About 37 percent of households have government water supply as their primary water source in the study area. Duration of water supply was only at night, limiting water supply for a very short period and inadequate water speed is the main problem that can be identified in this connection. Problems can be identified concerning the water supply for a short period.

About 63 percent of households in the study area utilize the groundwater wells as their primary water source. Problems such as water scarcity during dry seasons, fluctuation of groundwater levels, drying of groundwater source, groundwater sources are not constructed to a proper standard, deterioration of groundwater quality, inability to construct a groundwater source due to rock layers, and insufficiency of groundwater source can be identified concerning the use of groundwater wells. Furthermore, it can be seen that a few people in the study area do not have a permanent water source for their daily activities. This was due to the poor quality of groundwater, the high cost of constructing groundwater well, and the lack of groundwater access.

With the gradual urbanization, pollution of surface water sources, as well as groundwater sources due to garbage accumulation, is a major problem that can be identified in the present in the study area. It is also possible to identify the accumulation of water in the marshlands of the study area with the flood conditions during the rainy season. At the same time, the water from the nearby groundwater sources can be seen to be inappropriate for human consumption. The high cost of re-cleaning these water sources and the inability to use the water from those water sources for a short period were led to problems related to domestic water consumption.

Also, the lack of tanks with high water capacity to store enough water for the consumption in households is a problem for some families in the study area. This is due to their inability to purchase tanks with higher water capacity. Furthermore, drying up water sources during the dry season is one of the major problems that can be identified in many parts of the study area. Along with this, people living in low altitude areas for alternative water sources (bath wells, tube wells, and government water supply). But the peoples in high altitude areas suffer from lack of water for their daily activities.

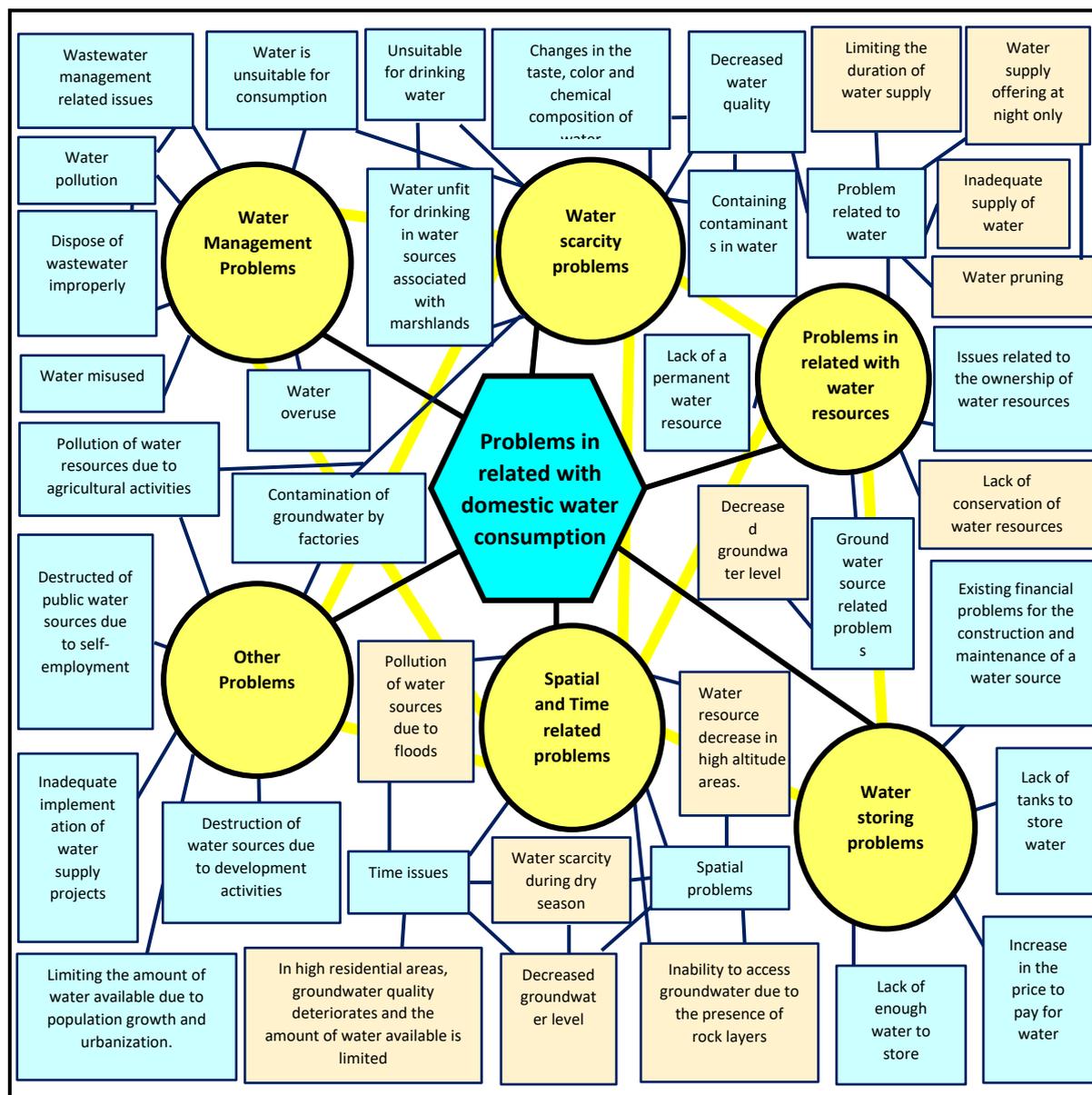


Figure 6: Problems/Challenges of Domestic Water Use

Water management related issues such as water overuse and water misuse can also be identified in the study area. The daily water consumption of the household increased as the number of members in the household increases. In comparison, the amount of water available from the water source has not changed which has led to problems in domestic water consumption. Also, the problems related to the disposal of wastewater can be identified in the area. This shows that several interrelated problems of domestic water consumption can be identified in the study area.

IV. CONCLUSION

In the wet season, most households (65 percent) using groundwater resources for their daily activities. Such as shallow wells, deep wells, tube

wells, etc. Furthermore, 35 percent of households using the government water supply for their daily activities. But in the dry season, most of them (51 percent) used the government water supply for their daily activities. The study found 392 domestic groundwater wells for drinking and other domestic use. Distribution pattern of groundwater wells identified as Random distribution. The distribution density of the groundwater wells is 0.4272. Also, the ratio between groundwater resources and households in the study area can be identified as 1: 2.34. Higher groundwater resource density can be identified in the western and northwestern regions in the study area. The results of this study revealed that the daily average water consumption of the study area is 119.44L per person per capita per day. About 10 percent of households per capita daily water consumption exceeds 150 Liters and 83 percent of

household per capita water consumption exceeds 100 Liters. But, about 17 percent of households have a per capita water consumption of fewer than 100 Liters. Near the main road, the daily average water consumption per person per capita per day was found to be lower than compared to other areas.

Bathing (31 percent) is the highest water usage activity in the study area. Toilet (24 percent) and Washing clothes (23 percent) are the second and third largest water consumers from total domestic water consumption. Furthermore, several factors can be identified that affected domestic water consumption in the study area. According to the correlation analysis can identify the household income, the level of education of the head of the household, the number of family members, and the capacity of the tank have a positive significant correlation with daily domestic water consumption in the study area.

Accordingly, six major issues related to domestic water consumption were identified in the study area. Such as problems related to the uneven spatial distribution of domestic water resources, spatial and time-related problems, water-storing problems, water scarcity, water management issues, other problems related to domestic water consumption, etc. It was also found that these problems are interrelated with each other.

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Analysis of Overnutrition Determinants among High School Students in Jakarta

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Abstract- This study is conducted to find the determinants of over-nutrition status among high school students in Jakarta. This study is a quantitative study using cross-sectional design. This study is using secondary data which collected in 2019 with total sample of 130 respondents. In this study, nutrition status is dependent variable while breakfast habits, energy, carbohydrates, protein, fat intake, physical activities, and gender as independent variables. Data used are in the form of questionnaire results, 24h-food recall interviews, body weight and height measurements. Data are analyzed using chi square. Study result shows 26.9% students are over-nutrition. Bivariate analysis result shows that there is no significantly relationship between nutrition and breakfast habits, energy, carbohydrates, protein, fat intake, physical activities, and gender. However, in this study shows a tendency that over-nutrition is higher on students who did not have breakfast, high protein intake, high on fat, and male. To prevent over-nutrition the school and community health center can give education related to balanced nutrition especially for male students. The school makes a policy for the supply of healthy balance nutrition foods in the school canteen.

Index Terms- Overnutrition, Student, Fat Intake, Breakfast Habits

I. INTRODUCTION

Nutrition problems are more covering overweight and obesity. Over-nutrition is a condition of abnormal or exaggerated fat accumulation [1]. Someone who had over-nutrition will face various health risk such as dyslipidemia, hypertension, cardiovascular disease, diabetes, fatty liver, and several kinds of cancers [2], [3]. Adolescents who had over-nutrition have 30%-50% higher risk of suffering metabolic syndrome in adulthood [4]. Other health risk related to over-nutrition on adolescent is decreasing cognitive function [5] such as decreased memory capacity [6], decreased ability to make decision [7], as well as an increase in impulse or unplanned actions without thinking of the consequences [8]. Study conducted by Meo in 2019 shows that adolescents with over-nutrition have lower cognitive function than adolescents with normal nutrition status.

According to WHO, nutrition prevalence in children and adolescents group has increased drastically from 4% in 1975 to more than 18% in 2016. In South-east Asia over-nutrition prevalence on children and adolescents in the age of 10-19 years old have increased from 7,6% in 2015 to 8,1% in 2016 [9]. The

Result of Basic Health Research on 2018 shows that in Indonesia over-nutrition prevalence on adolescents in the age of 16-18 years old is recorded on 13,5% and DKI Jakarta is a province with the highest over-nutrition prevalence in Indonesia with 21,1% [10].

Bad eating pattern within a certain period will increase the risk of someone to experience over-nutrition, including skipping breakfast in the morning [11], [12]. In Indonesia it is recorded the prevalence of adolescents who did not used to have breakfast by 59% [13]. There is finding showing that the habit of skipping breakfast is contributed in body weight gain, this is related to the change in appetite that increasing by noon [14], [15]. Study in Malaysia on over-nutrition adolescents shows that those who have a habit of skipping breakfast have higher prevalence than those who routinely eat breakfast [16].

Energy intake and macro nutrients have influence on the nutrition status of someone. Study in 1999 adolescents in Poland shows that 21.8% adolescents with over body weight will eat one or two times more than those with normal body weight [17].

One of the main factors that cause over-nutrition is lack of physical activities. On 2010, globally 81% adolescents in the age of 11-17 years old are not active enough [18]. Study on adolescents in China shows over nutrition on male has twice greater prevalence of 15.5% than 8.4% on female, this is due to female adolescents tend to lose weight more often through dieting [19].

Adolescent time is important period and become one of the fastest phases in human development. The changes related to the bad eating pattern in the adolescent time become a risk factor that has consequences towards health not only in the adolescent time but also in adulthood and the entire lifetime [20]. This study is conducted to examine the relationship between breakfast habits, energy intake, carbohydrate intake, protein intake, fat intake, physical activities, and gender and over-nutrition among high school students of SMAN 39 Jakarta.

II. MATERIAL AND METHOD

This study is a quantitative study with cross-sectional study design. The purpose of this study is to look at the description and determinant of over-nutrition. Data used in this study is secondary data from previous study "Cardiorespiratory Fitness Status Differences Based on Nutritional Status, Physical Activity and Other Factors on SMAN 39 Jakarta Students in 2019". The study used the total sample for research. Research location is at SMAN 39 Jakarta. There are 131 available samples

on secondary data, but only 130 samples used that match the sample criteria in this research.

Dependent variable is over-nutrition. Nutrition status is determined using Body Mass Index (BMI) by Age index. Body mass index is a person's weight in kilograms divided by the square of height in meters. Data used is the respondents' z-score value of anthropometry measurement calculation result, based on gender, and age. The measurement result classified to 2 groups namely over-nutrition (BMI by Age > +1 SD) and no over-nutrition (BMI by Age ≤ +1 SD).

Independent variables are breakfast habits, energy intake, carbohydrate intake, protein intake, fat intake, physical activities, and gender. Data regarding breakfast habits is the frequency of breakfast in a week. It grouped into not always have breakfast if the answer is never and 1-4 times a week and grouped into always have breakfast if the answer is 5 times or more in a week. Data regarding energy intake, carbohydrate intake, protein intake, and fat intake is obtained through single 24-h food recall filling. The grouping of intake variable by comparing energy intake, carbohydrate intake, protein intake, and fat intake with Recommended Daily Allowance (RDA) Indonesia 2019 based on gender and age of the respondents and classified to high category (> 100% of RDA Indonesia) and not high category (≤ 100% of RDA Indonesia)

Data regarding physical activities is score results from filling in the Physical Activity Questionnaire for Adolescents (PAQ-A) independently by the respondents. The result from this questionnaire filling is the average that calculated from the sum of the scores of each question. The questions adapted in primary research consisted of 6 questions with each question score of 1-5. The sum of scores from question 1 to 6 is then averaged. Then, data grouped into two categories namely less (< 3) and enough (≥ 3). Lastly, data regarding gender obtained from the respondent's identity in questionnaire.

Data analysis used in this study is univariate and bivariate data analysis. Univariate analysis used to look at the prevalence from each variable measured in the study, both independent and dependent variables. The result of univariate analysis is in the form of frequency distribution of dependent variable which is over-nutrition and independent variables which are breakfast habits, energy intake, carbohydrate intake, protein intake, fat intake physical activities, and gender. Bivariate analysis used to analyze the relation between independent variable and dependent variable. The test used in bivariate analysis is chi square statistic test by comparing between the observed frequency and expected frequency. Relation will deem significant if p-value is ≤ 0.05 and not significant if p-value is > 0.05.

III. RESULTS

The study is conducted on the students of SMAN 39 Jakarta. Number of samples in this study is 130 respondents. Below table is the table contained the result of univariate analysis of dependent and independent variables.

Table I: Result of Univariate Analysis

Variable	Amount (n)	Percentage (%)
Overnutrition Status		
Overnutrition	35	26,9

Not overnutrition	95	73,1
Breakfast Habits		
Not Always	71	54,6
Always	59	45,4
Energy Intake		
High	7	5,4
Not High	123	94,6
Carbohydrate Intake		
High	6	4,6
Not High	124	95,4
Protein Intake		
High	31	23,8
Not High	99	76,2
Fat Intake		
High	37	28,5
Not High	93	71,5
Physical Activity		
Less Active	109	83,8
Active	21	16,2
Gender		
Male	51	39,2
Female	79	60,8

Table I shows, from the total of 130 respondents there are 26.9% respondents experienced over-nutrition and 73.1% did not experience over-nutrition. Based on the result of univariate analysis, 54.6% were not always have breakfast, 5.4% were high energy intake, 4.6% were high carbohydrate, 23.8% were high protein intake, 28.5% were high fat intake, 83.8% were less active, 39.2% were male and 60.8% were female.

The result of bivariate analysis between dependent variable (over-nutrition) and independent variable can be seen in below table.

Table II: Result of Bivariate Analysis

Variable	Overnutrition		Not Overnutrition		P-value
	N	%	N	%	
Breakfast Habits					
Not Always	22	31	49	69	0,344
Always	13	22	46	78	
Energy Intake					
High	1	14,3	6	85,7	0,674
Not High	34	27,6	89	72,4	
Carbohydrate Intake					
High	1	16,7	5	83,3	1,000
Not High	34	27,4	90	72,6	
Protein Intake					
High	9	29	22	71	0,943
Not High	26	26,3	73	73,7	
Fat Intake					
High	10	27	27	73	1,000
Not High	25	26,9	68	73,1	
Physical Activity					
Less Active	29	26,6	80	73,4	1,000
Active	6	28,6	15	71,4	
Gender					
Male	15	29,4	36	70,6	0,755

Female	20	25,3	59	74,7	
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Based on the result of bivariate analysis, it can be concluded that there is no significant relationship between over-nutrition with energy intake, carbohydrate intake, protein intake, fat intake, physical activities, and gender. However, there is a tendency that a higher number of students with over-nutrition is found in students who did not have breakfast, high protein intake, high fat, and gender of male.

IV. DISCUSSION

In this study it is known that over-nutrition were 26.9%. Based on gender, the percentage of overnutrition in male is higher than female. The number of over-nutrition in SMAN 39 Jakarta is higher compared to the number of adolescent's over-nutrition prevalence in DKI Jakarta which has the highest prevalence of over-nutrition on adolescent in 2018 by 21.2% and if compared to the prevalence of over-nutrition on adolescent in Indonesia with 13.3%. Result obtained in this study is lower if compared to previous study that conducted in SMA Islam Al-Azhar 2 Pejaten Jakarta which was 31.2% [21] and study at SMAS Bunda Mulia which was 35.5% that experienced over-nutrition [22].

This study shows around 54.6% students are not always have breakfast every day and this number is almost similar to the prevalence of adolescent who did not have breakfast habits in Indonesia which were 59% [13]. Bivariate analysis result shows that there is no significant relation between breakfast habits and over-nutrition on students of SMAN 39 Jakarta. Although there is no statistically significant relation, there is a tendency that more students who over-nutrition are those who did not always have breakfast by 31% compared to those who always have breakfast by 22%. This is in line with study by Irdiana (2017) that did not find the relation between breakfast habits and nutrition status in adolescents, however there is a tendency that adolescents who skipping breakfast have the status of over-nutrition. Skipping breakfast will encourage excessive appetite that leads to more snacking and consume more high-energy foods to meet appetite at lunch time and resulted in weight gain [23]–[26]. There is no relationship might happen because the data in this study only measure the frequency of breakfast habit in a week period without paying attention to the type and amount of food consumed at breakfast, so it has not been able to describe breakfast habits of the students.

When consuming excessive energy, the body will metabolize the energy into fat, and the size of fat cells that continue to increase causes weight gain [27]. Study of Lisnawati (2016) on high school adolescent found the relation of energy intake and obesity. As well as the study by Sutrio (2017) shows that those who experience over-nutrition have higher energy intake or not match with the RDA Indonesia. However, the result of this study shows no relation between energy intake and over-nutrition on students of SMAN 39 Jakarta. No relation of energy intake and over-nutrition in this study might be influenced by several possibilities such as the tendency of students with over-nutrition that have adequate energy intake but lack of physical activities. In addition, there is presence of flat slope syndrome

where students with over-nutrition are more likely to reduce the number and type of intake in the interview [28].

Excessive carbohydrate intake continuously causes the glycogen stored in the liver and muscles are full and will further cause lipogenesis or convert glucose into fatty acid and glycerol. This in the end stored as fat. [27], [29]. The result of bivariate analysis in this study shows no relation between carbohydrate intake and over-nutrition on the students of SMAN 39 Jakarta. This study result is supported by study of Wulansari (2017). No relation between carbohydrate intake and over-nutrition in this study might be influenced by the presence of flat slope syndrome.

Excessive protein intake will contribute to the increase of body weight and body fat due to amino acids that are not needed by the body in protein synthesis will be converted to glucose and fatty acid which eventually will be stored as triglycerides [30]. This study result is the opposite of the study by Suryandari (2015) and the study by Sari (2019) that shows the difference in the proportion of protein intake level with obesity. Although there is no significant relationship, there is a tendency that students who over-nutrition are found to have high protein intake compared to low ones. Consuming protein in large number is said to be helpful in suppressing hunger and provide the feeling of satisfaction and full longer when compared to consuming other macronutrients especially carbohydrate, so that consuming more protein may cause a decrease in someone's daily intake [21]. In this study based on inter-independen variable test result obtained the relation of students who have high protein intake also have high energy intake in average, therefore this is suffice to explain the tendency of protein intake and over-nutrition though the result of statistic test shows no significant relationship. There is no significant relationship in this study might be the result of less supportive number of samples.

Fat is the largest energy reserve in the body with every gram energy produces 9 kcal. High concentration of calories on fat turned it into main contributor that can increase body weight [31], [32]. Chi square test result in this study did not find any relationship between fat intake and over-nutrition on the students of SMAN 39 Jakarta. This result is in line with study by Praditasari (2018) and Sari (2019). Although there is no relation statistically, there is a tendency that students who experience over-nutrition are found to have high fat intake compare to those in reverse. There is no significant relationship in this study might be influenced by the presence of flat slope syndrome.

The imbalance energy between excessive energy intake and lack of physical activities leads to the increase of adipocyte or body fat that resulted in weight gain [33]. The result of bivariate analysis in this study shows no meaningful relationship between physical activities and over-nutrition on students of SMAN 39 Jakarta. This result is in line with the result of study by Isnaeni (2015) and Pratiwi (2014). No significant relationship in this study might be the result of the type of assessment of physical activities used that only looking at the general physical activities without paying attention to the aspects of intensity, frequency and duration of the activities [34].

Based on the eating behavior, female pay more attention to the food consumed and its effect on health and weight control. A study shows that female adolescents lose weight more often, so that female limit their intake more and did not rule out the

possibility of male will have higher prevalence on over weight in a certain population [19]. This study result shows that over-nutrition happened more on male than female. This is in line with the study by Pratiwi (2014) that studied about the possibility of obesity on adolescent in High School that obesity is more common in male students with prevalence of 50%. One of the study results on adolescent in China shows that over-nutrition in male has bigger prevalence than on female, it is due to female adolescents tend to lose weight more often through dieting [19].

V. CONCLUSION AND RECOMMENDATIONS

There are 26.9% students of SMAN 39 Jakarta who overweight and obesity. Based on the chi-square test, it is known that no significant relationship between breakfast habits, energy intake, carbohydrate intake, protein intake, fat intake, physical activities, and gender with over-nutrition. However, there is a tendency of over-nutrition on the group that did not always have breakfast, high protein intake, high fat intake and gender of male.

For the school, can monitor the nutrition status routinely every 6 months to prevent and control the over-nutrition incidents on the students. Moreover, school can give education on balanced nutrition guidance and the importance of consuming various foods. The education might be held once a month for example in counseling class hours by home-room or counseling teacher through presentation in the form of written pictures or videos containing the balanced nutrition guidance issues and its messages. For community health center, can create a collaboration program with the school to do the nutrition status monitoring every six months and is expected to develop work program that directly involving schools in the form of providing education regarding balanced nutrition guidance so that it will support intervention and hit the target. For other researchers, conduct research on over-nutrition in adolescents with other variables such as parental nutrition status, socio-economic level, sleep duration and other factors with adding more samples.

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Internet of Things-Based Agriculture: A Review of Security Threats and Countermeasures.

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Abstract- The agriculture sector is gradually becoming more digitalize with large integration of Internet of Things into various farming processes such as land cultivation, farm monitoring, product processing, food marketing and consumers-farmers interaction. This paradigm shift from mechanical (or wired) agriculture technology to a wireless (or sensor based) agriculture system comes along with its own security challenges as viewed from cyber security perspective. This paper therefore provides an overview of IoT-based agriculture from cybersecurity perspective by (i) analyzing possible application of IoT devices in agriculture (ii) classifying IoT-based agriculture into four architectural layers (iii) analyzing security threats to IoT based agriculture and suggesting possible countermeasures based on IoT architectural layers for secure deployment of IoT devices in agriculture. With good consideration of threat and security requirements of IoT-based agriculture drawn from literature reviews, this paper presents possible countermeasures against attacks on IoT devices in agriculture. The proposed countermeasures prove to be highly secure against attacks on privacy, authentication, integrity, confidentiality and availability, with low power and time consumption. This research will assist researchers and agriculturists to choose the most suitable and flexible security mechanisms for IoT deployment in agriculture.

Index Terms- IoT, IoT-Based Agriculture, Smart Farming, Sensing Devices, IoT Threat Model, IoT Attack,

I. INTRODUCTION

In an attempt to address the problem of global food requirement, agricultural products exportation standard, economy diversification and digital economy, most developing countries (especially Nigeria) agricultural sector have started receiving more attention with gradual integration of modern digital technology and Internet of Things into various farming processes such as land cultivation, farm monitoring, irrigation, soil pH setting, product processing, food marketing and consumers-farmers interaction [1]. As developing countries' farming systems move towards embracing more advanced IoT deployment in water and soil quality monitoring, Intelligent greenhouses, milk and egg production, scientific disease and pest monitoring, the need to emphasize on IoT security become of great important [2].

Obviously, the primary purpose of IoT is the creation of interconnection between devices (such as computing devices), machines (both digital and mechanical machines), objects and people through applications using the web interface and mobile applications. In IoT network, sensor and actuator with unique attribute and identity usually communicate with each other to achieve certain functions such as perception, intelligent positioning, monitoring and tracking. This dynamic remote control in IoT network converts traditional control to an intelligent control thereby increasing efficiency and productivity [3]. Since all devices in IoT network need to interact with each other, security threats and attacks on devices, network and data become the greatest challenge [4, 5].

The concept of IoT-based agriculture involves the integration of IoT sensor, wireless communication, cloud computing, machine learning, big data technologies, and IoT technologies into agricultural (farming) processes in order to increase yield and quality of food products [6]. Advanced IoT technologies and solutions are incorporated into agricultural processes to minimize waste, maximize yield, and improve operational efficiency as in the case of underground remote sensors used for measuring blueberry irrigation in Chile which has reduced water wastage by 70%, and use of data analysis to predict and prevent crop diseases in India and Slovenia [7].

Although IoT based farming is highly beneficial and may help in solving the problem of food scarcity with the alarming population growth, but the deployment of heterogeneous interconnected devices comes along with its own potential cyber security challenges [8]. This research therefore presents an overview of IoT-based agriculture from cybersecurity perspective by (i) analyzing possible application of IoT devices in agriculture (ii) classifying IoT-based agriculture into four architectural layers (iii) analyzing security threats to IoT-based agriculture and suggesting possible countermeasures based on architectural layers for secure deployment of IoT devices in agriculture.

II. AN OVERVIEW OF IoT ECOSYSTEM FOR AGRICULTURE

Internet of Things interconnectivity involves the use of different technologies such as (computers, smart phones, smart watches, sensors, actuators and Radio-Frequency Identification (RFID) tags) for the purpose of information sharing and processing [9]. IoT is a global network of infrastructures based on standard and interoperable communication protocols where unique and identifiable devices interconnect using intelligent interfaces [10].

According to [11] IoT ecosystem for agriculture consist of four (4) components namely; IoT devices, communication technology, internet, data storage and processing (as represented in figure 1.0 below).

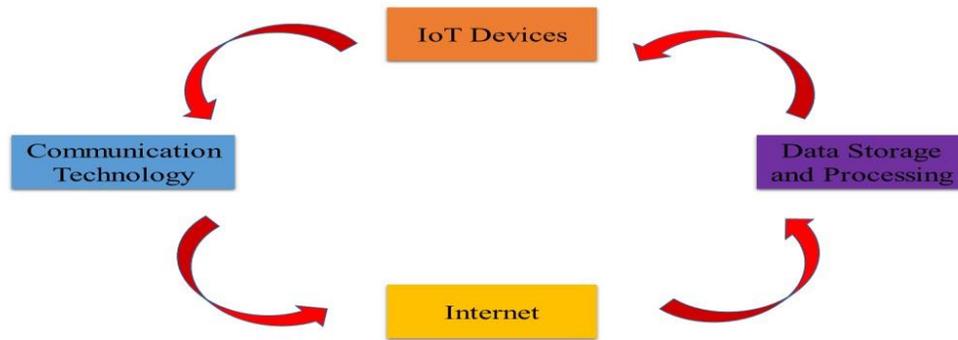


Figure 1.0 IoT Ecosystem

IoT sensors which may be mechanical, optical, electrochemical and airflow sensors are also known as IoT devices. They are made up of embedded systems with wireless connectivity to interact with sensors and actuators. They are used to gather and monitor data on environmental variables (such as soil nutrients, rainfall, leaf wetness, wind speed, humidity, solar radiation and air temperature) responsible for plant growth and animal production [12].

The communication spectrum is a mean of cellular network data transmission mechanism which may be licensed (with high cost of subscription and power consumption during transmission as drawback) or unlicensed (with high interference rate and security flaws as drawback) [13].

According to [14], there are many standards for wireless communications. These may be grouped into short-range standard such as ZigBee, Bluetooth, Z-Wave, passive and active radio and long-range standard such as Sigfox Lora, and NB-IoT

In [15], it was observed that availability of IoT data across the globe is made possible through a core network layer component known as the internet. It provides connectivity of heterogeneous devices through the middleware and connectivity protocols such as the service-oriented architecture (SOA), cloud-based IoT middleware and actor-based IoT middleware.

Some agricultural information system developed to manage and store agricultural data are; the silent herdsman platform, Onfarm system, Farmlogs, Cropx, Easyfarm and KAA [16].

III. APPLICATION OF IoT IN AGRICULTURE

Although there are numerous applications of IoT in agriculture, this research focuses on most recent applications of IoT in agriculture as represented in figure 3.0 below.

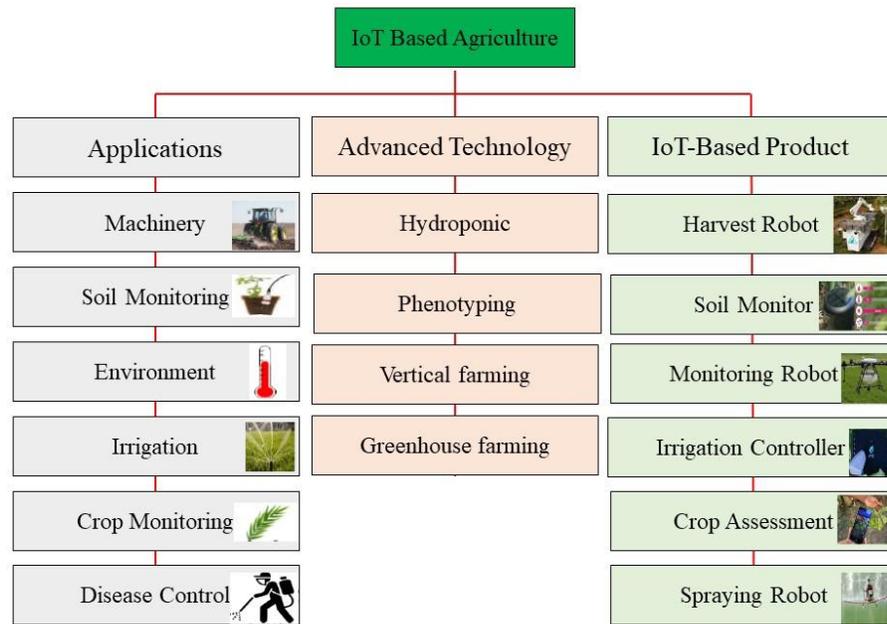


Figure 2.0 Application of IoT in Agriculture

The ability of IoT sensors to perform functions such as monitoring, tracking, tracing, precision and production have increased their applications in various fields of agriculture such as automation and precision farming, soil monitoring, irrigation monitoring, weather monitoring, greenhouse production, pest and disease control. The application of IoT in different field of agriculture shows the acquisition of agricultural data through different IoT sensors such as Wi-Fi, Zigbee, Bluetooth Sigfox, LTE-M1, LoRa and LTE-NB1. Such data are transmitted to the IoT cloud server through gateway which also receives commands (from the sever) that are sent for automation purposes. The cloud server supports services such as data storage, data analysis for decision making and visualization. This allows agriculturist to remotely manage farming processes via IoT devices [17, 18, 19].

According to [11], different factors in various agricultural areas can be monitored. IoT devices are applied based on their monitoring capability. The pattern and process of crop farming are affected by several environmental factors such as temperature, amount of rainfall, humidity, soil moisture, salinity, climate, solar radiation and pest movement. Collecting data on such factors enables proper planning and decision making in farm profit, risk and yield management. Libelium a company in Columbia, has installed several IoT kits to control such environmental conditions of the soil. This enables the farmer to get information about the humidity, temperatures, soil moisture, radiation and leaf wetness. Elaborating on other application areas of IoT based on its monitoring function, [20] mentioned that, IoT devices collate environmental factors data that can be used for automation purposes in other agricultural areas such as Aquaponics (a combination of aquaculture and hydroponics), forestry and livestock farming.

According to [21], using RFID and cloud base global positioning system, IoT devices are applied in tracking and tracing agricultural assets and products which allows data on the origin, location, life history, cropping environment, farming conditions, pest effect, storage conditions and supply time of products to be accessed along the supply chain.

According to [22], IoT applications have improved autopiloting in agricultural machineries such as vehicles, unmanned aerial vehicles (UAVs) and robots through GPS, proper mapping system and global navigation satellite systems (GNSSs). Such machines are controlled remotely based on available data collected through IoT system. Manufactural of agricultural machines such as CLAAS, implement IoT on their equipment, for purpose of auto pilot mode.

According to [24], IoT is applied in precision agriculture whereby advanced technologies such as Remote Sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS) that utilize wireless Sensor Network (WSN) are used to effectively reduce the potential risks in agricultural production processes which help farmers in making accurate and controlled farming processes and thereafter gathering important data (such as animal health, crop growth, environmental factors) required for agricultural production. The use of agricultural drones and other low-power, multi-function and wireless communication devices are remarkable application of IoT in precision farming.

According to [25] in precision agriculture, greenhouse where plants are grown in a controlled glasshouse, parameters are monitored and controlled through wireless sensor network technology. Mostly in field bus concept, hybrid systems wireless protocols such as ZigBee protocols based on IEEE 802.15.4 are used to control data transfer. IoT can be applied in greenhouse technology in order to achieve high efficiency, reduced human resource and low energy consumption [26].

IV. APPLICATION OF IOT IN AGRICULTURE

Although there are different architectural layers of IoT-Based farming, this research grouped IoT-based agriculture into four different layers as represented in figure 3.0 below.

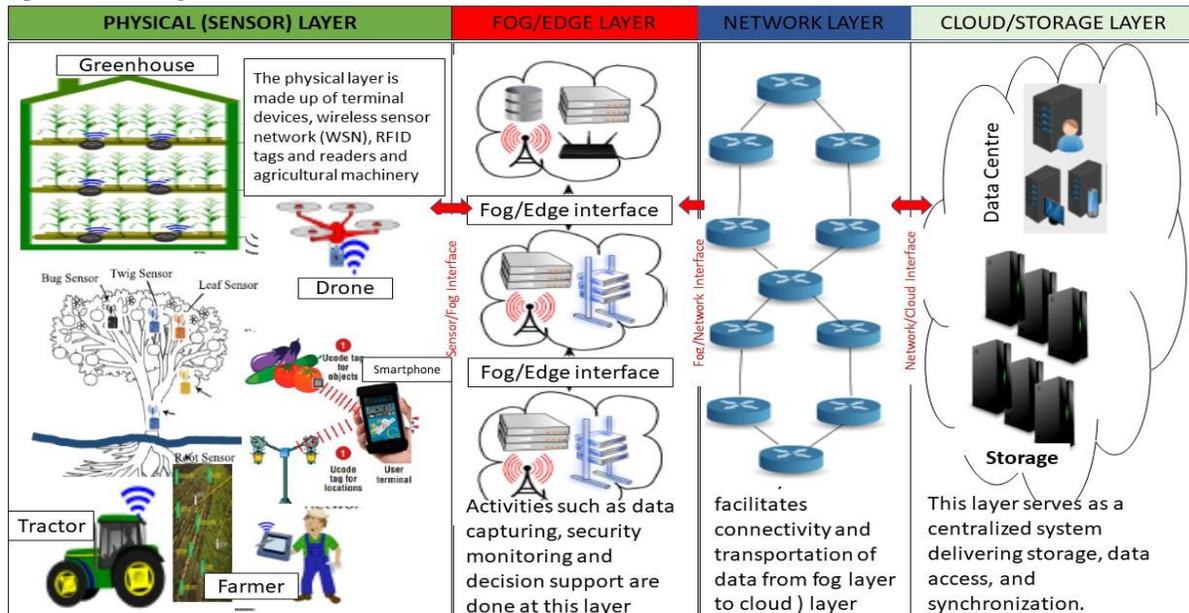


Figure 3.0 IoT-Based Agriculture Architectural Layers

A. Physical (Sensor) Layer

The physical layer consists of sensors (such as optical sensors, electrochemical sensors, acoustic sensors, airflow sensors, field-programmable gate array (fpga)-based sensors, ultrasonic ranging sensors, optoelectronic sensors, mechanical sensors, electromagnetic sensors, eddy covariance-based sensors, soft water level-based (swlb) sensors, light detection and ranging (lidar), remote sensing) smartphones and other IoT-enabled devices equipped with Global Positioning System for developing different IoT technologies in IoT agriculture for hydroponic, phenotyping, vertical farming photovoltaic farm, solar insecticidal lamp, greenhouse and irrigation farming. Processes in IoT-based agriculture are controlled by digital control system (e.g. Supervisory Control and Data Acquisition (SCADA)). In this layer of the IoT based Agriculture, data such as wind speed, temperature, humidity, pest and diseases are collected by the sensing devices using protocol such as Zigbee and processed by embedded devices which are transmitted through the network for processing and analysis. Most times, installation of agriculture sensor is done in areas where they can be easily accessed and monitored. This may easily give attackers unauthorized access to sensing devices which may give room for physical attacks. Other security challenges of this layer are unauthorized capturing of sensing devices like drones, Denial of Service (DoS) attacks, timing and replay attack, routing threat and other attacks [12].

The physical layer of IoT is made up of terminal devices, wireless sensor network (WSN), RFID tags and readers and agricultural machinery. Most of the agriculture related sensors are soil sensors, water sensors, plant and animal data sensors. Agricultural data such as wind speed, temperature, humidity pest and diseases are collected by the sensing devices using protocol such as Zigbee and processed by embedded devices which are transmitted through the network layer to other higher layers for processing and analysis. Most at times, installation of sensing (perception layer) devices are done in area where they can be easily accessed and monitored. This may easily give attackers unauthorized access to sensing devices which may give room to physical attacks. Other security challenges of this layer are unauthorized capturing of sensing devices like drones, Denial of Service (DoS) attacks, timing and replay attack, routing threat and other attacks [21].

B. Fog Computing Layer

In order to save processing time of data generated by sensing devices in the physical layer and timely decision, data need to be processed closer to the IoT devices. This bring in the concept of Fog/Edge Computing in the architecture of IoT based agriculture. This layer is made up of multiple edge nodes, closer to the farmer and end-devices and reduces the workload on the network and centralized cloud layer. Activities such as data capturing (and data aggregation, filtering, encrypting and encoding of data), detection (anomaly detection and device failures prediction.), prediction (which mostly rely on machine learning models), security monitoring and decision support are done at this layer [27, 28].

C. Network (Connectivity) Layer

This layer facilitates connectivity and transportation of data through high speed networks such as 5G from fog computing layer to cloud (storage) layer [29]. It also provides interaction interface between the storage (cloud) layer. It binds all layers through means of communication [30, 31]. This layer controls routing by delivering interconnectivity of strategies-based network and transmit various

agriculture data through a wired transmission channels such as CAN bus and RS485 bus or wireless transmission channel such as Zigbee, Bluetooth, LoRa and NB-IoT. It also sends controls command to the sensor or physical layer so that IoT devices can take necessary action.

C. Cloud Computing (Storage) Layer

This layer serves as a centralized system delivering storage, data access, and synchronization. It follows the platform as a service architecture, running applications and importing their data. Data pushed in from the edge layer are saved in distributed file system (DFS) which are mined using analytical software. Some examples of cloud computing platforms are Amazon Web Services, Google Cloud, John Deere Farmers Business Network. Some examples of IoT based agriculture data storage platforms are Easyfarm, Farmobile, the silent herdsman, Farmlogs, Onfarm and system [16, 32, 33].

IV. THREAT MODEL OF IOT-BASED AGRICULTURE AND COUNTERMEASURES

Attackers can orchestrate diverse attacks on IoT devices and data in smart farming. These devices are Heterogeneously interconnected and generate enormous amount of dynamic and spatial data. This data is used for day to day monitoring and control of the farm. Unauthorized access to such information may cause potential threat to agricultural processes. An attacker may use information leakage to bypass security measures, gain competitive advantages cause economic losses, Some IoT-based farms analyze collected data using third party agronomy analytics. Such parties may compromise IoT system, inject malicious code to redirect data transmission when given legitimate credentials to farm data on the edge for real time analytics [34, 35].

Discussing IoT device vulnerabilities [16] and [35], stated that, IoT devices are highly vulnerable to physical attack, tampering, theft, predators and animals. Some IoT devices use weak security algorithms with limited memory, high power energy consumption with gateway highly prone to attacks such as forwarding, congestion attack and denial of service (DoS). Sometimes, the IoT devices applied in precision agriculture are vulnerable to attacks such as device capture attack [35] whereby an attacker captures IoT device such as drones and extracts cryptographic implementations and gains unrestricted access to the information stored in the device's storage. The agriculture network layers can be vulnerable to DoS attacks, wireless signal jamming, and man in the middle attack [16]. The cloud layer is also very prone to data tampering, session hijacking, logon abuse, DoS, unauthorized services attack which can affect automated processes in the farms.

In IoT-based agriculture, interconnected objects such as flying drones, on field sensors and autonomous tractors communicate with each other either directly in the form of machine to machine (M2M) or through cloud based assisted network of which can support Message Queue Telemetry Transport (MQTT21), Constrained Application Protocol (CoAP22) or other IoT communication protocols. The major security issue here is authorization and trust issues. It is important that messages and commands are sent from trusted and secure entity rather than vulnerable and malicious entity This implies that only authorized entity and farm owner can send farm data on crop yield, livestock health, breeding and other important information [36].

IoT-based farms consist of interconnected entities which allows high rate propagation of malware through the network. Arriving at malware detection mechanism that perfectly fits into IoT based farming still remains a great security challenge as malware detection mechanism that works against malware in physical layer may not work in edge or cloud layer of IoT agriculture architectural layer. Although AI assisted malware detection techniques have been proposed but no IoT based farming malware detection system in specific [37].

In a situation where all devices are connected together in smart farming, IoT devices at each architectural layer can be prone to a remote-control attack such as botnet where zombies of infected systems are used to infect and attack other farm devices and network.

The Physical/Sensor layer which consist of physical IoT entities such as sensors, RFID tags, zigbee and bluetooth devices mostly developed in open fields are basically prone to physical attacks such as physical damage, malicious code injection, node tampering, mass node authentication, fake node and side channel attack. In some case of physical/sensor layer attack, an attacker may physically destroy sensor devices installed in open and closed area to cause physical denial of services. Sometimes the adversary may choose to add fake nodes to sensory systems and inject malicious code into the IoT network through the network. At times the adversary may attack the encryption mechanism of the farm devices by capitalizing on factors such as electromagnetic radiation, power and time consumption [12].

In the work of [38], researchers considered the network layer of IoT based farming to be vulnerable to attacks such as man in the middle attack, wireless signal jamming, DoS and DDoS. The cloud/edge layer is vulnerable to attacks such as unauthorized services, data tampering, logon abuse, session hijacking, SQL injection and DoS, which have adverse effects on automated processes.

Attacks on IoT devices in IoT-based farming was classified into different categories according to [23] which include attacks against confidentiality, integrity, availability, privacy and authentication. Explaining attacks against privacy, [23] pointed out that this type of attack is based on knowing and identifying the location and identity of IoT devices at the physical or sensor layer to gather privacy data and compromise the privacy of the IoT devices. Attacks against authentication impersonate authorized nodes by forging identities of IoT devices or fog, edge or cloud nodes. This attack may take the form of replay attack or masquerade attack. Attack against confidentiality eavesdrop IoT network traffic between IoT devices and access point at the physical or sensor layer so as to misuse the IoT devices to fulfil the adversary intention. Such attack may be in the form of known key and password attack, brute force attack and tracing attack. Attack against availability tends to create Denial of Service (DoS) or Distributed Denial of Service (DDoS) in order to make services unavailable for IoT based farming. This may happen when an attacker floods the servers with huge amount of unwanted

data and false data injection. Attack against integrity tends to modify private agriculture data such as pH settings through unauthorized access. Attacker can do this through biometric template attack, man-in-the-middle (MITM), forgery attack and trojan horse attack.

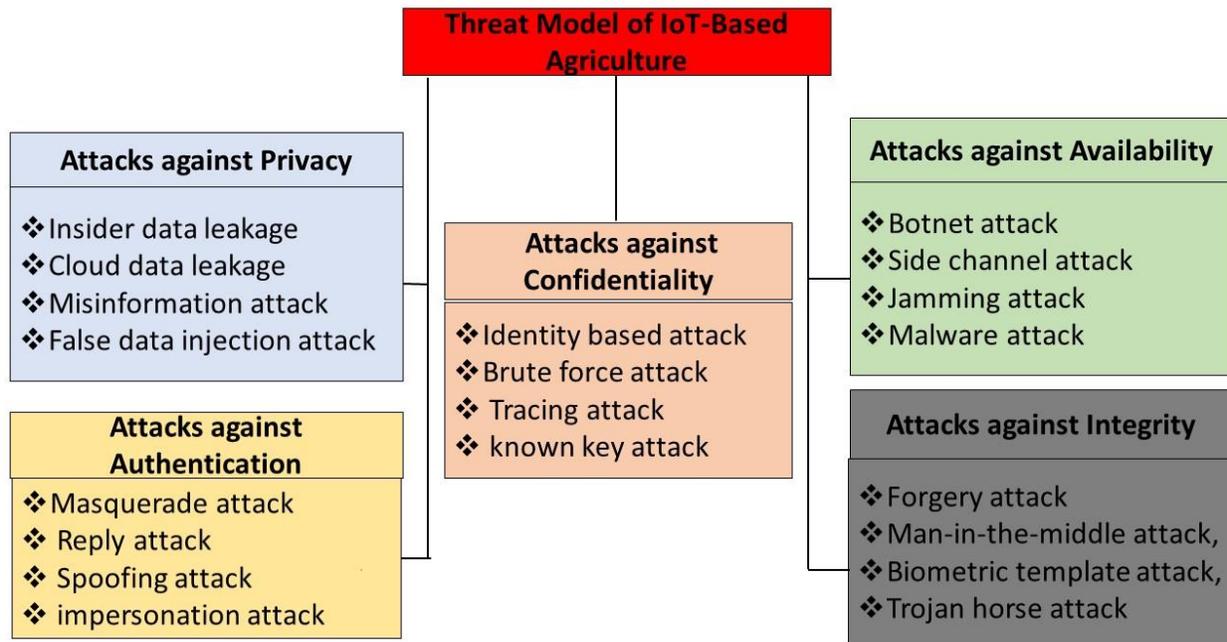


Figure 4.0 IoT-Based Agriculture Architectural Layers

A. Classes of Attacks on IoT-Based Agriculture

Considering different literatures, this research classifies attacks on IoT-based agriculture into five (5) different classes namely privacy, authentication, confidentiality, availability and integrity attack.

1). Attacks Against Privacy

These attacks occurred when an attacker capitalized on the location and identity of smart devices at the agriculture sensor layer to gain an unauthorized access to data and compromise device privacy. Accessing farm data such as crop growth, soil nutrients, humidity, rainfall, soil type and pH settings that are collected at the IoT sensory layer may expose farmer’s daily activities and give a competitor undue advantage. Farm data need to be preserved from any form of unauthorized access as it may lead to different form of attack like agricultural espionage. Farm privacy is based on the principle of secrecy, anonymity and autonomy [39, 40].

2). Attacks Against Authentication

This attack attempt to gain authorized access to devices and nodes through identity forgery. The attacker impersonates a legitimate device user and gain access to agriculture devices either at the sensor, network, fog or cloud layer. This identity-based attack may come in the form of masquerade, reply, Spoofing, and impersonation attack [42].

In masquerade attack, fake nodes are presented as legitimate nodes in order to log into server at agriculture sensor or edge layer. In replay attack, the privacy of agriculture devices and data are exploited by an attacker through interception of agriculture data packets between IoT devices with an access point at the sensor layer and relaying them without modification to their destinations.

The major target in spoofing are agriculture sensory and other farm RFID system. The attacker gains unauthorized access to farm IoT devices and network by capturing information from farm network after injecting fake information on nodes and RFID system.

3). Attacks Against Confidentiality

In attack against confidentiality, the attacker eavesdrop IoT based agriculture device and network with access point at the sensor layer in order to misdirect and compromise smart agriculture devices into making wrong discussions and performing wrong activities category of attacks attempts to adversarial eavesdrop. This attack may take the form of identity based, brute force, tracing and known key attack. In Identity-based attack, an adversary steal device identity by applying three attack techniques. First, the attacker collects farm device data using eavesdropping Secondly, the attacker tracks and trace farm device to using identification information gathered through eavesdropping. Thirdly, he duplicates password to gain to compromise farm device and data confidentiality [43].

In brute force attack, the attacker systematically tries all possible passwords of agriculture device and node, passphrases them until an accurate password is gotten. This attack is used to obtain private IoT and user data such as username, password and personal identification number. The targeted devices are mostly those at the sensor layer [44].

In tracing attack, the attacker finds the real identity of IoT devices at the agriculture sensor layer after gathering privacy information on devices [44].

In known-key attack, the attacker uses the knowledge of previously compromised session key to generate new session keys. This attack may also get access to encrypted keys after series of monitoring and evaluation of encryption time or leaked information on devices processing duration. Device confidentiality is mostly compromised [44].

4). *Attacks Against Availability*

The goal of this attack is to make the service of agriculture IoT devices unavailable. This form of Denial of Service may occur when the attacker flood server with large amount of unwanted data, update IoT software remotely with false data injection or lunch attack on the accurate localization for UAV with a malicious 5G station. Another example of availability attack is Botnet attack [46].

In botnet attack, attackers may capitalize on the interconnection of devices in IoT agriculture, to control them by a central malicious system. An army of infested farm IoT devices called zombies are used to infect other farm network through different means [47].

5). *Attacks Against Integrity*

This attack may take the form of misinformation attack, trojan horse attack and biometric attack. The goal of the attacker is to gain unauthorized access to IoT devices and modify device settings and data. This may lead to malfunctioning and inaccurate data generation. Misinformation attack endanger farm data integrity through the release of false information about crops and IoT devices. The attacker present fake data report that mimic the form of original farm data report claiming the outbreak of crop diseases or device malfunctioning. At the end, it will consume time and farm resources to analyze data and prove initial result wrong. Other forms of attacks against integrity are forgery attack, trojan horse attack, man-in-the-middle attack, biometric template attack [49].

B. *Countermeasures to Attack on IoT-Based Agriculture*

In order to secure IoT device in agriculture environment, they need to a proper implantation of some security measures during IoT device development, deployment and usage. Some of these measures are proposed in different literatures.

1). *Solutions to Privacy Attacks*

In protecting the privacy of IoT based farming data, [50] proposed an APPA protocol that uses cryptographic based techniques such as signature of knowledge and paillier cryptosystem to achieve anonymity and unforgeability with the aim of protecting IoT devices against false data injection attack and eavesdropping attack.

Considering the security of location privacy of IoT-based agriculture [51], proposed the implementation of location privacy algorithm which can resist attacks such as inference and colluding attack.

In order to protect farmer's privacy when data are collected and combined from sensor layer, [52] suggested that the dynamic privacy protection model should be implemented. The model which is also referred to as DPP model, uses three basic security phase which include; security classification in terms of privacy weight definition, data pair identification (content-oriented) and input data table (for evaluation performance).

To ensure trust relationship between IoT devices in an agriculture environment [53] proposed the adoption of homomorphic encryption which consist of two schemes trust evaluation techniques for agriculture IoT devices. The first scheme suggests that authorized proxy is fully trusted and collusion is completely eliminated between evaluation party and authorized proxy. The second scheme suggests that no collusion between evaluation party and authorized proxy and authorized proxy may not be fully trusted. These schemes are implemented whenever a node decrypts data, with trust evaluation done using the trust evaluation algorithm.

2). *Solutions to Authentication Attacks*

Information in electronic tags are automatically identified and captured by Radio Frequency Identification (RFID) technology. This technology allows easy control and monitoring of farm crops and animals. An attack on the RFID tags will compromise automated processes in farm. To secure this technology, a lightweight authentication solution for IoT application was proposed by [54] This mechanism is based on entities such as an authenticated cloud and backend database servers, reader and RFID-tag based on some cryptographic principles such as unconnected pseudo-identity, hash function and emergency key. This security techniques proves to secure IoT application against attacks such as location tracking, forgery, cloning and DoS [55].

A delegated authentication mechanism for securing IoT data collection as it is being transported over insecure channels was suggested by [56]. This mechanism is called SOPP (Semi-Outsourcing Privacy Preserving Scheme), it applied cryptographic algorithm (called elliptic curve) as a non-interactive (one way) authentication between the cloud layer and physical device layer. Delegating authentication process to the cloud layer, blocks unnecessary access. Data integrity is achieved through data decryption at the data centre.

One of the existing security flaws in present RFID technology is that Authentication process in existing RFID protocol is done without encryption. In order to overcome this flaw, [57] proposed a light weight cryptographic technique by which authentication is done based on encrypted password.

A code structure authentication technique for IoT devices that overcome the resource constrained in existing certificate-based signatures authentication in IoT environment was created by [58]. The technique seems efficient as management of confirmation code in IoT environment seems to be very easy. This technique can be applied in IoT based agriculture.

IoT terminal node and platform asymmetric mutual authentication scheme that combines SHA1 and feature extraction was proposed for IoT security by [59]. The proposed scheme is highly efficient in terms of throughput with reduced computation and communication cost. This mechanism can be applied in IoT base agriculture environment.

3). *Solutions to Data Confidentiality Attacks*

Confidentiality in IoT based agriculture can be achieved based on cryptographic mechanism such as cipher-text based access-based mechanism. [60] used an elliptic curve integrated encryption scheme (ECDH) to provide data confidentiality and integrity through the generation of message authentication key and encryption key in lightweight attribute-based encryption scheme. This scheme proves robust than other cryptographic mechanism that use decisional bilinear Diffie-Hellman exponent. This scheme is highly secure against attribute set attack and plaintext attack.

A cipher-text attribute-based encryption technique for fog enabled IoT in order to achieve data confidentiality and with variability in a case of access request from an identified IoT device was proposed by [61].

4). *Solutions to Availability Attacks*

Denial-of-Service (DoS) and botnet attack mainly target the availability of IoT network services. Implementation of firewall for intrusion detection and prevention system on IoT-Based farm network will keep the farm inform about any unnecessary traffic inflow. Installation of anti-DoS attack mechanism and implementation of physical security and light weight encryption algorithms in IoT nodes vicinity and light weight encryption algorithms will enable IoT devices in farm to provide uninterrupted service [46] [47].

5). *Solutions to Data Integrity Attack*

In [49], a lightweight integrity verification security architecture (LIVE) that can be implemented for IoT based agriculture was proposed. The scheme provides content verification for named data networking. The security levels included in this architecture are non-cacheable, 1-cacheable and all cacheable. Cryptographic technique (Merkle Hash Tree algorithm) is used to produce token for signature generation. A secure Threshold Cryptography based Group Authentication (TCGA) scheme which is capable of verifying all nodes in IoT network was proposed in [61]. This scheme proved secure and tend to reduce overhead handshake and power consumption. This security mechanism can be implemented in IoT based agriculture to protect data integrity.

A security technique based on Digital certificate with datagram transport security was proposed in [62]. In this technique, pre-shared key mechanism is replaced with digital certificate for IoT Authentication in secure communication. The authentication procedures involve; (i) client's request is sent to server (ii) Client receives server's certificate (iii) client decrypts certificate using server's public key as a means of verification (iv) sever uses same mechanism for verification and both can start communicating. Application of this communication mechanism will solve integrity problem in IoT based agriculture.

Considering data integrity protection and authentication, [63] suggested a privacy preserving protocol based on Message Authentication Code (MAC). where original IoT data carries MAC solution that can be verified by sender during communication whether data has been altered by attacker. Implementing this can protect agriculture IoT data

C. *Countermeasures to Attacks Based on Architectural Layers*

1). *Solutions to Attacks on Physical/Sensor Layer*

According to [64] applying hybrid linear combination encryption and Hash function between IoT devices communications can secure the agriculture sensor layer against impersonation and DoS attack.

According to [60] data confidentiality and integrity can be achieved against chosen plaintext and attribute set attack through the implementation of encryption mechanism using secure symmetric cryptographic system based on Lagrange secret sharing for message exchange between IoT devices in sensor layer. Encryption keys are generated using elliptic curve cryptosystem.

A homomorphic encryption-based trust management system consisting of three entities such as node, evaluation party and authorized proxy which is used to protect IoT devices against conflict behaviour and On-off attack was discussed in [65]. This can be applied between IoT devices and an access point at agriculture sensor layer.

Applying blockchain technology in private information retrieval at sensor layer can protect IoT privacy [42].

The physical layer nodes should be protected against any form of physical and natural disaster such as fire, thunder storm, and human activities. Nodes should be equipped and protected with tamper-resistant hardware, any attempt on the node should wipe out the memory so that data will not be leaked to attacker especially secret key. Good password should be used for the bootstrap loader of IoT nodes and JTAG interface should be disabled. Sensor nodes should be routinely checked using special devices such as magnifiers and not with the human eyes alone and also be protected against attack through camouflaging.

2). *Solutions to Attacks on Fog Layer*

The work of [63] proposed the use of chaos-based cryptography and message authentication code to mitigate eavesdropping attacking at the fog layer. In this technique, access point and fog node add a message authentication code to the original data to verify the integrity of the transmitted data among IoT devices.

According to [66], false data injection, Denial of Service and differential attack can be mitigated by implementing Chinese remainder theorem, homomorphic paillier encryption and one-way hash chain in the fog computing layer to filter injected false data

3). Solutions to Attacks on Network Layer

The work of [60] suggested that the network layer can be protected against chosen-plaintext attack by adapting a searchable encryption scheme based on setup, KeyGen, store, trapdoor and search.

In-depth protection against other attacks can be achieved by segmenting and segregating farm networks and functions. Limiting unnecessary lateral communication within farm network and hardening of network and network infrastructures through the installation antivirus, firewalls, intrusion prevention and detection systems can keep the network layer protected against known and unknown attack. Regular backup, implementation of adequate password policies, validation of software integrity and performing out-of-bound network management are good measures against network layer attacks.

4). Solutions to Attacks on Cloud Layer

According to [67] collision attack at the cloud layer can be overcome through proxy sever deployment and one-way anonymous key agreement protocol. Cryptographic measures such as data encryption and two step verification implemented between device and cloud interaction can provide secure device to cloud interaction. If the cloud is a hybrid cloud connected at the network layer, Virtual Private Network (VPN) implementation can encrypt traffic between agriculture device and cloud, if connected at application layer, SSL/TLS implementation can encrypt traffic between agriculture device and cloud

IV. CONCLUSION

Wide adoption of Internet of Things in agricultural have raised security and privacy issues in cyber domain. In research, application of IoT devices in agriculture is being discussed extensively with in-depth reviews of existing security and privacy solutions for IoT-based agriculture. The research also proposed a five-tire (tier) threat model for IoT-based agriculture with implementable countermeasures. This research will be beneficial to researchers (and agriculturist) intending to develop and deploy IoT devices for agriculture purposes. Future research will focus on security issues in deployment of 5G communication technologies in IoT-based farming.

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Some Properties of Induced Intuitionistic Fuzzy Sets

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Abstract: In this paper we have proved some basic properties, related to union and intersection, of four different types of induced intuitionistic fuzzy sets.

Key words: Degree of membership, degree of non-membership, induced Intuitionistic fuzzy set.

Mathematics Subject Classification: 03B99, 03E72.

I. INTRODUCTION

The notion of Intuitionistic fuzzy set (IFS) was introduced by Atanassov in [1]. Various properties on intuitionistic fuzzy sets were discussed by many authors in [2- 4,9]. The concept of induced intuitionistic fuzzy sets was introduced in [5]. A few relations between induced intuitionistic fuzzy sets and second order induced intuitionistic fuzzy sets were established in [6,7]. Some complement properties of induced intuitionistic fuzzy sets were discussed in [8]. Here, in this paper, we have proved some properties on union and intersection of four different types of induced intuitionistic fuzzy sets.

The section 2 deals with the definitions and notations of intuitionistic fuzzy set and induced intuitionistic fuzzy sets on a set.

In section 3, we have proved some properties related to union and intersection four different types of induced intuitionistic fuzzy sets corresponding to intuitionistic fuzzy sets of a set E .

II. PRELIMINARIES

This section contains some basic definitions and notations which are used through-out the paper.

Definition 2.1 [1-3]: Let E be any non-empty set. An intuitionistic fuzzy set A of E is an object of the form $A = \{ (x, \mu_A(x), \nu_A(x)) : x \in E \}$, where the functions $\mu_A: E \rightarrow [0,1]$ and $\nu_A: E \rightarrow [0,1]$ denotes the degree of membership and the non-membership functions respectively and for every $x \in E, 0 \leq \mu_A(x) + \nu_A(x) \leq 1$.

If A and B are two intuitionistic fuzzy sets of a non - empty set E then the following relations are valid [3]:

$A \subseteq B$ if and only if for all $x \in E, \mu_A(x) \leq \mu_B(x)$ and $\nu_A(x) \geq \nu_B(x)$;

$A = B$ if and only if for all $x \in E, \mu_A(x) = \mu_B(x)$ and $\nu_A(x) = \nu_B(x)$;

$A \cap B = \{ (x, \min(\mu_A(x), \mu_B(x)), \max(\nu_A(x), \nu_B(x))) : x \in E \}$;

$A \cup B = \{ (x, \max(\mu_A(x), \mu_B(x)), \min(\nu_A(x), \nu_B(x))) : x \in E \}$.

Considering the degree of membership $\mu_A(x), \mu_B(x)$ and the non - membership $\nu_A(x), \nu_B(x)$ for each element $x \in E$ of the intuitionistic fuzzy sets A and B respectively, of a non-empty set E , the four different types of induced intuitionistic fuzzy sets are defined as follows:

Definition 2.2 [5]: If A and B are two intuitionistic fuzzy sets of a non - empty set E then

$$A^\circ(B) = A^\circ = \{ (x, \mu_A(x), \min(\nu_A(x), \nu_B(x))) : x \in E \};$$

$$A_\circ(B) = A_\circ = \{ (x, \mu_A(x), \max(\nu_A(x), \nu_B(x))) : x \in E \};$$

$$A^*(B) = A^* = \{ (x, \max(\mu_A(x), \mu_B(x)), \nu_A(x)) : x \in E \};$$

$$A_*(B) = A_* = \{ (x, \min(\mu_A(x), \mu_B(x)), \nu_A(x)) : x \in E \}.$$

Note 2.3 [5]: It is to be noted that

$$A^\circ(B) \neq B^\circ(A), A_\circ(B) \neq B_\circ(A), A^*(B) \neq B^*(A), A_*(B) \neq B_*(A).$$

III. SOME PROPERTIES OF INDUCED INTUITIONISTIC FUZZY SETS

Let A_1, A_2 and B be three intuitionistic fuzzy sets of E . Then,

Property 3.1: i) $(A_1 \cup A_2)^*(B) = (A_1)^*(B) \cup (A_2)^*(B)$

ii) $(A_1 \cap A_2)^*(B) = (A_1)^*(B) \cap (A_2)^*(B)$

Proof: i) $(A_1 \cup A_2)^*(B) = \{ (x, \max(\mu_{A_1 \cup A_2}(x), \mu_B(x)), \nu_{A_1 \cup A_2}(x)) : x \in E \}$

$$= \{ (x, \max(\mu_{A_1}(x), \mu_{A_2}(x), \mu_B(x)), \min(\nu_{A_1}(x), \nu_{A_2}(x))) : x \in E \} \quad \dots \dots \dots (3.1.1)$$

Also, $(A_1)^*(B) \cup (A_2)^*(B)$

$$= \{ (x, \max(\mu_{A_1}(x), \mu_B(x)), \nu_{A_1}(x)) : x \in E \} \cup \{ (x, \max(\mu_{A_2}(x), \mu_B(x)), \nu_{A_2}(x)) : x \in E \} =$$

$$\{ (x, \max(\mu_{A_1}(x), \mu_{A_2}(x), \mu_B(x)), \min(\nu_{A_1}(x), \nu_{A_2}(x))) : x \in E \} \quad \dots \dots \dots (3.1.2)$$

From (3.1.1) and (3.1.2) we have,

$$(A_1 \cup A_2)^*(B) = (A_1)^*(B) \cup (A_2)^*(B).$$

ii) $(A_1 \cap A_2)^*(B) = \{ (x, \max(\mu_{A_1 \cap A_2}(x), \mu_B(x)), \nu_{A_1 \cap A_2}(x)) : x \in E \}$

$$= \{ (x, \max(\min(\mu_{A_1}(x), \mu_{A_2}(x)), \mu_B(x)), \max(\nu_{A_1}(x), \nu_{A_2}(x))) : x \in E \}$$

Therefore, for each $x \in E$,

$$\begin{aligned} \mu_{(A_1 \cap A_2)^*(B)}(x) &= \begin{cases} \max(\mu_{A_1}(x), \mu_B(x)) & \text{for } \mu_{A_1}(x) \leq \mu_{A_2}(x) \\ \max(\mu_{A_2}(x), \mu_B(x)) & \text{for } \mu_{A_2}(x) < \mu_{A_1}(x) \end{cases} \\ &= \begin{cases} \mu_B(x) & \text{for } \mu_B(x) \geq \mu_{A_1}(x), \mu_{A_2}(x) \\ \min(\mu_{A_1}(x), \mu_{A_2}(x)) & \text{for } \mu_B(x) \leq \mu_{A_1}(x), \mu_{A_2}(x) \\ \mu_B(x) & \text{for } \mu_B(x) \in [\mu_{A_1}(x), \mu_{A_2}(x)] \text{ or } [\mu_{A_2}(x), \mu_{A_1}(x)] \end{cases} \dots \dots \dots (3.1.3) \end{aligned}$$

Also, $(A_1)^*(B) \cap (A_2)^*(B)$

$$\begin{aligned} &= \left\{ \left(x, \max(\mu_{A_1}(x), \mu_B(x)), \nu_{A_1}(x) \right) : x \in E \right\} \cap \left\{ \left(x, \max(\mu_{A_2}(x), \mu_B(x)), \nu_{A_2}(x) \right) : x \in E \right\} \\ &= \left\{ \left(x, \min(\max(\mu_{A_1}(x), \mu_B(x)), \max(\mu_{A_2}(x), \mu_B(x))), \max(\nu_{A_1}(x), \nu_{A_2}(x)) \right) : x \in E \right\} \end{aligned}$$

Therefore, for each $x \in E$,

$$\mu_{(A_1)^*(B) \cap (A_2)^*(B)}(x) = \begin{cases} \mu_B(x) & \text{for } x \in E \text{ and } \mu_B(x) \geq \mu_{A_1}(x), \mu_{A_2}(x) \\ \min(\mu_{A_1}(x), \mu_{A_2}(x)) & \text{for } x \in E \text{ and } \mu_B(x) \leq \mu_{A_1}(x), \mu_{A_2}(x) \\ \mu_B(x) & \text{for } x \in E \text{ and } \mu_B(x) \in [\mu_{A_1}(x), \mu_{A_2}(x)] \text{ or } [\mu_{A_2}(x), \mu_{A_1}(x)] \end{cases} \dots \dots \dots (3.1.4)$$

Also, for each $x \in E$,

$$\nu_{(A_1 \cap A_2)^*(B)}(x) = \max(\nu_{A_1}(x), \nu_{A_2}(x)) = \nu_{(A_1)^*(B) \cap (A_2)^*(B)}(x) \dots \dots \dots (3.1.5)$$

From (3.1.3), (3.1.4) and (3.1.5) we have,

$$(A_1 \cap A_2)^*(B) = (A_1)^*(B) \cap (A_2)^*(B).$$

Property 3.2: i) $(A_1 \cup A_2)^\circ(B) = (A_1)^\circ(B) \cup (A_2)^\circ(B)$

ii) $(A_1 \cap A_2)^\circ(B) = (A_1)^\circ(B) \cap (A_2)^\circ(B)$

Proof: i) $(A_1 \cup A_2)^\circ(B) = \left\{ \left(x, \mu_{A_1 \cup A_2}(x), \min(\nu_{A_1 \cup A_2}(x), \nu_B(x)) \right) : x \in E \right\}$

$$= \left\{ \left(x, \max(\mu_{A_1}(x), \mu_{A_2}(x)), \min(\nu_{A_1}(x), \nu_{A_2}(x), \nu_B(x)) \right) : x \in E \right\} \dots \dots \dots (3.2.1)$$

Also,

$$\begin{aligned} (A_1)^\circ(B) \cup (A_2)^\circ(B) &= \left\{ \left(x, \mu_{A_1}(x), \min(\nu_{A_1}(x), \nu_B(x)) \right) : x \in E \right\} \cup \left\{ \left(x, \mu_{A_2}(x), \min(\nu_{A_2}(x), \nu_B(x)) \right) : x \in E \right\} \\ &= \left\{ \left(x, \max(\mu_{A_1}(x), \mu_{A_2}(x)), \min(\min(\nu_{A_1}(x), \nu_B(x)), \min(\nu_{A_2}(x), \nu_B(x))) \right) : x \in E \right\} \end{aligned}$$

$$= \left\{ \left(x, \max(\mu_{A_1}(x), \mu_{A_2}(x)), \min(v_{A_1}(x), v_{A_2}(x), v_B(x)) \right) : x \in E \right\} \dots \dots \dots (3.2.2)$$

From (3.2.1) and (3.2.2) we have,

$$(A_1 \cup A_2)^\circ(B) = (A_1)^\circ(B) \cup (A_2)^\circ(B).$$

$$\begin{aligned} \text{ii) } (A_1 \cap A_2)^\circ(B) &= \left\{ \left(x, \mu_{A_1 \cap A_2}(x), \min(v_{A_1 \cap A_2}(x), v_B(x)) \right) : x \in E \right\} \\ &= \left\{ \left(x, \min(\mu_{A_1}(x), \mu_{A_2}(x)), \min(\max(v_{A_1}(x), v_{A_2}(x)), v_B(x)) \right) : x \in E \right\}. \end{aligned}$$

Therefore, for each $x \in E$,

$$v_{(A_1 \cap A_2)^\circ(B)}(x) = \begin{cases} v_B(x) & \text{if } v_B(x) \leq \max(v_{A_1}(x), v_{A_2}(x)) \\ \max(v_{A_1}(x), v_{A_2}(x)) & \text{if } v_B(x) > \max(v_{A_1}(x), v_{A_2}(x)) \end{cases} \dots \dots \dots (3.2.3)$$

$$\begin{aligned} &(A_1)^\circ(B) \cap (A_2)^\circ(B) \\ &= \left\{ \left(x, \mu_{A_1}(x), \min(v_{A_1}(x), v_B(x)) \right) : x \in E \right\} \cap \left\{ \left(x, \mu_{A_2}(x), \min(v_{A_2}(x), v_B(x)) \right) : x \in E \right\} = \\ &\left\{ \left(x, \min(\mu_{A_1}(x), \mu_{A_2}(x)), \max(\min(v_{A_1}(x), v_B(x)), \min(v_{A_2}(x), v_B(x))) \right) : x \in E \right\} \end{aligned}$$

Therefore, for each $x \in E$,

$$v_{(A_1)^\circ(B) \cap (A_2)^\circ(B)}(x) = \begin{cases} v_B(x) & \text{if } v_B(x) \leq \max(v_{A_1}(x), v_{A_2}(x)) \\ \max(v_{A_1}(x), v_{A_2}(x)) & \text{if } v_B(x) > \max(v_{A_1}(x), v_{A_2}(x)) \end{cases} \dots \dots \dots (3.2.4)$$

Hence from (3.2.3) and (3.2.4) we have, for each $x \in E$,

$$v_{(A_1 \cap A_2)^\circ(B)}(x) = v_{(A_1)^\circ(B) \cap (A_2)^\circ(B)}(x) \dots \dots \dots (3.2.5)$$

Also, for each $x \in E$,

$$\mu_{(A_1 \cap A_2)^\circ(B)}(x) = \min(\mu_{A_1}(x), \mu_{A_2}(x)) = \mu_{(A_1)^\circ(B) \cap (A_2)^\circ(B)}(x) \dots \dots \dots (3.2.6)$$

So, by (3.2.5) and (3.2.6) we have,

$$(A_1 \cap A_2)^\circ(B) = (A_1)^\circ(B) \cap (A_2)^\circ(B).$$

Property 3.3: i) $(A_1 \cup A_2)_*(B) = (A_1)_*(B) \cup (A_2)_*(B)$

ii) $(A_1 \cap A_2)_*(B) = (A_1)_*(B) \cap (A_2)_*(B)$

Proof: i) For each $x \in E$,

$$\begin{aligned} \mu_{(A_1 \cup A_2)_*(B)}(x) &= \min(\mu_{A_1 \cup A_2}(x), \mu_B(x)) = \min(\max(\mu_{A_1}(x), \mu_{A_2}(x)), \mu_B(x)) \\ &= \begin{cases} \max(\mu_{A_1}(x), \mu_{A_2}(x)) & \text{when } \mu_B(x) \geq \mu_{A_1}(x), \mu_{A_2}(x) \\ \mu_B(x) & \text{elsewhere} \end{cases} \dots \dots \dots (3.3.1) \end{aligned}$$

and $\mu_{(A_1)_*(B) \cup (A_2)_*(B)}(x) = \max(\min(\mu_{A_1}(x), \mu_B(x)), \min(\mu_{A_2}(x), \mu_B(x)))$

$$= \begin{cases} \max(\mu_{A_1}(x), \mu_{A_2}(x)) & \text{when } \mu_B(x) \geq \mu_{A_1}(x), \mu_{A_2}(x) \\ \mu_B(x) & \text{elsewhere} \end{cases} \dots \dots \dots (3.3.2)$$

Hence from (3.3.1) and (3.3.2) we have, for each $x \in E$,

$$\mu_{(A_1 \cup A_2)_*(B)}(x) = \mu_{(A_1)_*(B) \cup (A_2)_*(B)}(x) \dots \dots \dots (3.3.3)$$

Also for each $x \in E$,

$$\nu_{(A_1 \cup A_2)_*(B)}(x) = \nu_{A_1 \cup A_2}(x) = \min(\nu_{A_1}(x), \nu_{A_2}(x)) = \nu_{(A_1)_*(B) \cup (A_2)_*(B)}(x) \dots \dots \dots (3.3.4)$$

So, from (3.3.3) and (3.3.4) we have,

$$(A_1 \cup A_2)_*(B) = (A_1)_*(B) \cup (A_2)_*(B).$$

ii) For each $x \in E$,

$$\begin{aligned} \mu_{(A_1 \cap A_2)_*(B)}(x) &= \min(\mu_{A_1 \cap A_2}(x), \mu_B(x)) = \min(\min(\mu_{A_1}(x), \mu_{A_2}(x)), \mu_B(x)) \\ &= \min(\mu_{A_1}(x), \mu_{A_2}(x), \mu_B(x)) \dots \dots \dots (3.3.5) \end{aligned}$$

and $\mu_{(A_1)_*(B) \cap (A_2)_*(B)}(x) = \min(\min(\mu_{A_1}(x), \mu_B(x)), \min(\mu_{A_2}(x), \mu_B(x)))$

$$= \min(\mu_{A_1}(x), \mu_{A_2}(x), \mu_B(x)) \dots \dots \dots (3.3.6)$$

Therefore from (3.3.5) and (3.3.6), we have,

$$\mu_{(A_1 \cap A_2)_*(B)}(x) = \mu_{(A_1)_*(B) \cap (A_2)_*(B)}(x) \dots \dots \dots (3.3.7)$$

Also for each $x \in E$,

$$\nu_{(A_1 \cap A_2)_*(B)}(x) = \nu_{A_1 \cap A_2}(x) = \max(\nu_{A_1}(x), \nu_{A_2}(x)) = \nu_{(A_1)_*(B) \cap (A_2)_*(B)}(x) \dots \dots \dots (3.3.8)$$

Hence from (3.3.7) and (3.3.8), we have,

$$(A_1 \cap A_2)_*(B) = (A_1)_*(B) \cap (A_2)_*(B).$$

Property 3.4: i) $(A_1 \cup A_2) \circ (B) = (A_1) \circ (B) \cup (A_2) \circ (B)$

ii) $(A_1 \cap A_2) \circ (B) = (A_1) \circ (B) \cap (A_2) \circ (B)$

Proof: i) For each $x \in E$,

$$\mu_{(A_1 \cup A_2) \circ (B)}(x) = \mu_{A_1 \cup A_2}(x) = \max(\mu_{A_1}(x), \mu_{A_2}(x)) = \mu_{(A_1) \circ (B) \cup (A_2) \circ (B)}(x) \dots \dots \dots (3.4.1)$$

Also, for each $x \in E$,

$$\begin{aligned} \nu_{(A_1 \cup A_2) \circ (B)}(x) &= \max(\nu_{A_1 \cup A_2}(x), \mu_B(x)) = \max(\min(\nu_{A_1}(x), \nu_{A_2}(x)), \mu_B(x)) \\ &= \begin{cases} \min(\nu_{A_1}(x), \nu_{A_2}(x)) & \text{when } \mu_B(x) \leq \nu_{A_1}(x), \nu_{A_2}(x) \\ \mu_B(x) & \text{elsewhere} \end{cases} \dots \dots \dots (3.4.2) \end{aligned}$$

$$\begin{aligned} \nu_{(A_1) \circ (B) \cup (A_2) \circ (B)}(x) &= \min(\max(\nu_{A_1}(x), \nu_B(x)), \max(\nu_{A_2}(x), \nu_B(x))) \\ &= \begin{cases} \min(\nu_{A_1}(x), \nu_{A_2}(x)) & \text{when } \mu_B(x) \leq \nu_{A_1}(x), \nu_{A_2}(x) \\ \mu_B(x) & \text{elsewhere} \end{cases} \dots \dots \dots (3.4.3) \end{aligned}$$

From (3.4.2) and (3.4.3) we have, for each $x \in E$,

$$\nu_{(A_1 \cup A_2) \circ (B)}(x) = \nu_{(A_1) \circ (B) \cup (A_2) \circ (B)}(x) \dots \dots \dots (3.4.4)$$

So from (3.4.1) and (3.4.4) we have,

$$(A_1 \cup A_2) \circ (B) = (A_1) \circ (B) \cup (A_2) \circ (B).$$

ii) For each $x \in E$,

$$\mu_{(A_1 \cap A_2) \circ (B)}(x) = \mu_{A_1 \cap A_2}(x) = \min(\mu_{A_1}(x), \mu_{A_2}(x)) = \mu_{(A_1) \circ (B) \cap (A_2) \circ (B)}(x) \dots \dots \dots (3.4.5)$$

Also for each $x \in E$,

$$\begin{aligned} \nu_{(A_1 \cap A_2) \circ (B)}(x) &= \max(\nu_{A_1 \cap A_2}(x), \nu_B(x)) = \max(\max(\nu_{A_1}(x), \nu_{A_2}(x)), \nu_B(x)) \\ &= \max(\nu_{A_1}(x), \nu_{A_2}(x), \nu_B(x)) \dots \dots \dots (3.4.6) \end{aligned}$$

and $\nu_{(A_1) \circ (B) \cap (A_2) \circ (B)}(x) = \max(\nu_{(A_1) \circ (B)}(x), \nu_{(A_2) \circ (B)}(x))$

$$\begin{aligned} &= \max(\max(\nu_{A_1}(x), \nu_B(x)), \max(\nu_{A_2}(x), \nu_B(x))) \\ &= \max(\nu_{A_1}(x), \nu_{A_2}(x), \nu_B(x)) \dots \dots \dots (3.4.7) \end{aligned}$$

Hence, from (3.4.5), (3.4.6) and (3.5.7) we have,

$$(A_1 \cap A_2) \circ (B) = (A_1) \circ (B) \cap (A_2) \circ (B).$$

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The impact of SWC measures on social, environmental and economic aspects in Mizraf watershed in Tigray

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Abstract- The general objective of the research was to assess the impact of SWC measures on social, environmental, and economic aspects in Mizraf watershed in Tigray, Northern Ethiopia. Data were collected through semi-structured interviews, transect walks, field observation and field measurements demonstrated that Degradation Status after implementation of SWC highly reduced & all most 80% of it was reclaimed. The results of the positive impact of SWC measures implemented in this watershed were. The gully depth averagely reduced to 1m deep & it is all most dead (reclaimed). New spring water developed its discharge was measured 42.3 lit per second and the tunneling, rill, and sheet erosions are ceased out and this contributed to land productivity. However, some of the check dams constructed in both the upstream and downstream parts of the landscape collapsed due to faulty construction, and the Bureau of Agriculture as well as the Food for Work campaign program coordinators did not give enough follow-up and monitoring of check dam maintenance.

Index Terms- land degradation, impact assessment, soil and water conservation, Mizraf watershed, northern Ethiopia

I. INTRODUCTION

U1.1 . Importance and principles of SWC
Under natural conditions, the protection of soil loss depends on selecting an appropriate strategy of soil conservation [1]. Soil and water conservation are crucial at preventing the loss of nutrients from agricultural land, prevent pollution of water bodies, reduce rates of sedimentation in reservoirs, rivers, ditches, and canals [2]. The basic principles of controlling soil erosion by runoff include reducing rain droplets on the soil, reducing runoff volume and velocity, and increasing the resistance of the soil erosion[3, 4]. The two technical means by which the principles of soil and water conservation can be achieved are the barrier approach and the cover approach [3, 4].

1.2. Impact of Soil and Water Conservation Measures

The basic advantages of SWC structures are to significantly reduce soil loss and its consequences. In practice, the loss of soil particles and essential plant nutrients and applied fertilizers can be reduced through the structures. In addition to that, the reduction of

slope length between structures also reduces the volume of runoff and thereby reduce soil loss. Most structures gradually develop to the bench and decrease the slope gradient and velocity of runoff. Owing to these characteristics of the structures, [5]. [6] reported that grass strips, bench terraces, and fanyajuu reduce soil loss by 40, 76, and 88%, respectively, compared to the land without those structures.

In Debre Mewi, Ethiopia, stone bund and soil bund decreased soil erosion by 72.9 and 83.7%, respectively compared to non-treated land [7]. In northern Ethiopia, especially in Tigray, the stone bund is current in reducing soil loss by 68% particularly at an early age. Its effectiveness decline as the gradient on the upslope side of the bunds accumulates sediment and thus needs frequent maintenance to keep the effectiveness of the bunds [8]. Another study in the Tigray region reported that stone bunds can trap as much as 64% of the soil moved by water erosion [9]. Even though soil bunds decrease soil erosion by 47% in an experimental site established in the central highlands of Ethiopia when compared to the non-terraced land, the absolute soil loss from the terraced site was still high (24 t ha-1 year-1) [6]. and required certain techniques to reduce soil loss to a recommended tolerable range [4] And in the Somali region [10], compared to the untreated site.

In Tanzania, the construction of physical SWC was effective in conserving soil moisture (26-36%) compared to the land without those structures, [5]. The higher yield and biomass production at the upslope of the stone bund are attributed to, among other advantages, the moisture-conserving role of those structures [8]. The second-order stochastic dominance analysis in the Hunde-Lafto area, in eastern Ethiopia, inferred SWC alleviated the adverse impacts of soil moisture stress in crop production, especially in the circumstance of unfavorable rainfall[11].

The soil system remains a basic factor of crop yields when compared with plant genetic potential and weather conditions because of the environment it provides for root growth [12]. Therefore, increasing and sustainable agricultural production should focus on only maintaining higher levels of useful biological productivity but also at ensuring that the system is stable enough to maintain soil quality [13]. The key soil characteristics that affect agricultural yield sustainability are nutrient content, water holding capacity, organic matter content, soil reaction, topsoil depth,

salinity, and soil biomass [2]. The relationship between soil erosion and soil productivity is multifaceted and includes various factors which often depend on each other [14]. The effect of soil erosion on soil properties and hence crop yield varies with location and management [12]. Generally, the loss of soil organic matter and minerals influence crop production [15]. Erosion can also have a direct impact on production through the formation of rills and the following washing out of seeds or through the accumulation of eroded materials on germinated crops [14]. However, total soil is the solitary most important factor in explaining productivity changes [16]. Therefore, the total soil loss can be reduced by physical SWC measures, among others.

Agricultural productivity and SWC objectives are highly complementary because conservation of soil, water, and natural vegetation yield to higher crop productivity and livestock, and thus the improvement of livelihoods [17]. [16] reported that without any SWC, crop yields will decline approximately by 1.5% year⁻¹, being equivalent to a 30% decline over 20 years. The SWC structures not only act as merely a barrier to water-induced erosion but also form a total barrier to tillage erosion [7].

The physical SWC techniques are deemed as an investment for which a substantial benefit is speculated later and for years to come. However, practical models and empirical equations are less available to project the effects of SWC structures, as they touch many parameters and create a complex matrix. Moreover, the off-site role is less feasible to predict and commonly overlooked even in existing estimations and computations.

The short-term impacts of bunds or terraces are the reduction of slope length and the formation of small retention basins for runoff and sediment and to reduce the quantity and eroding the capacity of the overflow [18]. The medium and long-term effects of bunds include the decrease in slope gradient by forming bench terraces [19]. In the long term, slow-forming terraces created by bunds are often related to high spatial variability in soil fertility and crop response which is because of soil moisture and tillage erosion in between structures [18].

The study by [11], in the Hunde-Lafto area in eastern Ethiopia, showed that SWC resulted in higher yields in scarce rainfall conditions. Grass strips, bench terraces, and fanyajuu have increased maize yields by 29.6%, 101.6%, and 50.4% and bean yields by 33.3%, 40%, and 86.7%, respectively as compared to sites without those structures [5]. The effect of SWC structures is detected after several years of the structure being built. In three-year-old structures, [20] documented 10 and 15% yield increments in Debre Mewi and Anjeni (Ethiopia) watersheds, respectively, as compared to the yield before constructing those structures (fanya juu, soil bund). In this study, yield reduced in the first and second years. In line with this, [21] reported that 79.3% of the interviewed farmers observed the increment of yield after 2 years of SWC structures (the soil bund and stone bund) were put in place. [22], indicated a 4-50% reduction in yield during the first 3-5 after the construction of SWC structures due to waterlogging problems followed by subsequent yield increases ranging from 4-15%.

[18] reported that after a few years of its construction, stone bunds increased cereal and teff yields by 8 and 11%, respectively, even by considering the area lost as the result of the conservation structures. Indigenous stone bunds (Kab) sites have improved sorghum yields by 56-75% as compared to another non-terraced

land in north Shewa, Ethiopia [19]. [23] showed that stone bunds, soil bunds, and grass strips have a significant output on crop yield in the low rainfall areas of the Blue Nile basin in Ethiopia and high risk-reducing effects in high rainfall areas. This current study indicated that grass strips have the highest production elasticity among SWC technologies in this low rainfall area. In these areas soil bunds have risk averting impacts. The stone bunds elapsed 3-21 years increased crop yield by 0.58-0.65 t ha⁻¹ in Tigray, Ethiopia [18].

Stone bunds contribute to agricultural productivity because of soil moisture conserving role. Results based on multiple plot observations per household showed agricultural sites with stone bunds are significantly productive than those without it in dry areas but not in the high rainfall areas of northern Ethiopia [24]. [8] projected the yield variations on sites with stone bunds and estimated a 7% increment compared to non-terraced site.

Soil erosion and sedimentation are natural phenomena involved in landscape formation [25]. For decades, the off-site impact of land degradation mainly in the form of soil erosion is a widely reported and even more negative impact on the economy than on-site impact, especially in developed countries. Notable off-site impacts are siltation, eutrophication, water yield and flooding, and damage on infrastructures. Reservoir sedimentation has tremendous economic and environmental impacts. Some of the experienced impacts include the Consequence of storage loss on production loss, downstream effects of reservoirs on the river bed, reduction in efficiency of power generation due to sedimentation, and contamination due to sediment [26]. Between 1950 and 1970, mega irrigation schemes and hydropower dams were constructed in Asia, Africa, and Latin America to stimulate agricultural development and economic development while ensuring water and electricity supply [27]. faced a siltation problem. It is estimated that 1.5 billion Mg of sediment is deposited each year in the USA reservoirs [28]. In Australia, for major dams constructed for domestic water supply, agriculture and mining were completely silted in 25 years. According to the Egyptian Aswan high dam lifespan is only half of the original design life due to high inflow of sediment from Ethiopian highland. In Ethiopia, the problem of siltation is even more serious than the other parts of the world owing to the high intensity of rainfall, rugged topography and where more than 85% of the population depends on agricultural activities for their livelihood. For instance, investigation on 50 micro dams constructed for an irrigation scheme in Tigray region showed that the area-specific sediment yield of the reservoirs ranged between 345 to 4935 t/km/year with a mean of 1900 t/km/year, the figure higher than global and Africa average of about 1500 and 1000 t/km/year. Many dams constructed to store water for irrigation and drinking were being silted up while under construction [29, 30]. Serious sedimentation is in the Borkena dam, in northern Ethiopia where the dead storage volume of the reservoir completely silted before construction ended [22]. [1] reported an earth dam in the headwaters of Modjo River was filled with 96000 m³ of silt only two years after construction. Nationally investment in hydroelectric dams in Ethiopia is mainly in the Omo-Gilgile basin. Although no sufficient research on the issues, emerging evidence depicted that the sustainability of Gilgel Gibe dams was under question. For stance, [1] reported that Gilgel Gibe river alone

contributes sediment load of 277,437 t/year and the total sediment load of 4.50×10^7 t/year to Gilgel Gibe I and this amount could cover 3.75×10^7 m³/year of the dam volume. The authors concluded that the Gilgel Gibe dam would be filled up in 24 years whereas it was planned to serve for 70 years. The Soil and Water Assessment Tool (SWAT) model by [1] similarly confirmed a drastic increase in sediment flux to Gilgel Gibe dam I if business as usual continued.

1.3. The objectives of this study

The general objective of the research was to assess the impact of SWC measures on social, environmental, and economic aspects in Mizraf watershed in Tigray, Northern Ethiopia.

Specific research questions are:

- What are the success or failure of previous conservation measures?
- What is the positive effect of SWC measures on land Degradation, Spring source, Gully size, Status of the surrounding cultivated land and crop production productivity?
- What are the major lesson learned and recommendations for up-scaling successful practices?

II. MATERIALS AND METHODS

2.1. Background of the study area

This study was carried out from August 2017 to June 2018 to assess the various impacts of SWC measures implemented in the Mizraf watershed in the Tigray region, northern Ethiopia. It was selected for the study due to its representativeness concerning intensive SWC practices such as stone bunds, hillside and bench terraces, trenches, gabion check dams and enclosure with enrichment of plantations have been carried out. SWC interventions have been started before 15 years ago in this watershed, but they have not been evaluated scientifically; Elevation varies between 2002-2600 m above sea level and the watershed has a total area of 385 ha (i.e from this about 22 ha is cultivable land and the rest 363 ha is hillside. The number of households and the total population in the watershed were 26 and 140 respectively. The landholding size of most farmers in the study area was less than one ha. The rainfall is unimodal but erratic in variability and amount within and among seasons. The main rainy season is very short and extends from June to the first week of September. The mean annual rainfall is 650 mm and the mean monthly temperature during the growing season ranges between 17-29°C (Ethiopia National Meteorological Service Agency, 2016, Unpublished). Mizraf watershed is categorized by different landscapes that range from flat or undulating plains and rolling land to steep mountains and very steep escarpments. Topography affects the type and concentration of SWC measures to be used. The degradation of landscapes also varies as one moves from flat to steep areas. The soil types vary according to the landscape. The chief soil kinds are cambisols on undulating plains and rolling land, vertisols on hilly and steep to very steep lands, and vertisols on flat and plateau landforms. The farming system is predominantly crop-oriented. Teff cultivation (*Eragrostis tef*) is the dominant cultivated land followed by wheat (*Triticum Vulgare*). Other crops such as barley (*Hordeum vulgare*) and maize (*Zea mays*) are also imperative crops. Irrigation is also

extensively practiced in the study site. Despite the high crop diversification in the watershed, yet we observed that there is a need for crop productivity to be improved by appropriate cropping systems and soil and water management practices. Livestock husbandry is also vital in the farming system, but stock numbers are being declined because of fodder shortages. The vegetation is scant and has been overgrazed for centuries and comprises of shrubs and small trees with little economic value.

2.2. Data collection

Primary and secondary data were collected related to the environmental, economic, and social impact assessment of SWC measures in the watershed. Primary data were gathered from farmers' semi-structured questionnaire interviews, group discussions, field measurements, and observations. Before and after comparisons of indicators of environmental, economic, and social impact were used during data collection. Secondary data such as climate, demographic, and other related data in this study were collected from the Bureau of Agriculture. The topographic transect walk method was employed for the assessment of natural resources and existing SWC measures in the watershed.

The major data collection instruments were semi-structured questionnaires interviews, field measurements, and observations to investigate the impact of SWC measures on social, environmental, and economic aspects in Mizraf watershed in Tigray, Northern Ethiopia. During the field measurements and observations appraisals of the vegetation and density, the impact of the existing SWC measures, level of erosion before and after the SWC program, and levels of SWC measures at different parts of the landscape were recorded.

2.3. Data analysis

Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) and the result was presented in tables. Qualitative data obtained through interviews were analyzed by using content analysis. It followed the following steps: identification of the main themes, assignment of codes to the main themes, and classification responses under the main themes. Finally, the information from key informants was categorized into themes that were used to cement the findings of the study.

III. RESULT AND DISCUSSION

3.1. Socio-demographic Characteristics of Sample Households

The study result shows the key demographic and socioeconomic characteristics of the surveyed households. A large percentage of household heads (65.1%) were males whereas females constituted the remaining proportion (34.9%). Family sizes ranged from one to 8 persons, with an average family size of 4.9 persons. About 32.2% of respondents had between one and five household members, while a majority (67.8%) of them had six or more members in the family. Most of the surveyed households were engaged in mixed farming activities (85.3%), and some of them (2.5%) were engaged in some form of off-farm activities like petty trading and informal labor. The landholdings of households in the study area varied from 0.5 ha to 1.1 ha with an average holding size of 0.8 ha per household. A large number of households were aware of land degradation particularly soil

erosion, soil nutrient depletion, and development of gullies as major problems in their localities.

3.2. Impact of SWC Measures on Social, Environmental and Economic aspects in Mizraf watershed in Tigray Region, Northern Ethiopia

For the last two decades, the problem of soil erosion has been of great concern in the Tigray region in general and the Mizraf watershed in particular. This is because inappropriate land management practices coupled with intensive rainfall and steep terrains resulted in big gullies, topsoil erosion, and poor soil fertility. To minimize the effects of soil erosion, the governments of the region and country have allowed the implementation of SWC programs at a watershed level. The consequences of different measures were assessed in this study in different land uses to evaluate the positive impact on soil, water (moisture), fertility, biomass, and reduction of soil and water losses with runoff by comparison with the situation before/after the program.

3.2.1 Environmental Impact

One watershed is selected to see the environmental impact of “Mizraf”, watershed. The watershed is almost completely treated with different soil and water conservation structures mainly deep trench, percolation ponds, and stone-faced trench integrated with gabion check dams and biological SWC plants like Elephant grass, Vetiver grass, populus tree, “Leusnia”, “Sasbania Sasban” e.t.c. seen photos below.

Comparing between pre-and post-implementation of the SWC measures according to farmers’ qualitative evaluation gully



A) The photo was taken in Dec. 2009



B) The photo was taken in Dec. 2011



C) The photo was taken in September 2019.

Figure 1: The impact of SWC measures on gully reclamation (Photo A, B, C)

Table 1: Shows the general changes on gully reclamation before after the implementation

Degradation Status before implementation	Degradation Status after implementation	Spring source Status before implementation	Spring source Status after implementation	Gully size before implementation	Gully size after implementation
It was fragmented, very deep, highly exposed to erosion	It is highly reduced & all most 80% of it is reclaimed.	It was very dry fragmented, very deep, highly exposed to erosion	The water sprout out on the gully stays till December & January. One hand pump constructed from the developed water service for the community throughout the year. Some ponds around the banks of the gully also for their animals.	The depth of the gully was about 3m deep, 12m wide & it was actively expanding.	The gully depth is now averagely about 1m deep & it is all most dead (reclaimed).

Source filed measurement (2019)



Figure 2: Biological SWC activities integrated with physical SWC activities in gully reclamation

3.2.1.1. Degradation Status before and after implementation



D, The photo was taken in September 2008 before implementation



E, Photo was taken in Dec. 2010



The photo was taken in Dec. 2011



F, Photo was taken in Dec. 2011

Figure 3 Degradation Status before and after implementation (D, E, F)

The above photo shows before the implementation of SWC activities, there was a big degradation process. That is the cultivated land was fragmented into different segments and it was very difficult to perform activities such as cultivating the land, crossing the gully for both the animals and even for human beings. But now different gabion check dams (i.e. about 16) and loose rock check dams (about 9) were constructed and integrated with different biological conservations. Therefore; the degradation status is now reduced by more than 75% and almost the gully is reclaimed (relieved).

Sample photo that shows comparing and contrasting the previous and present status of the gully and the gabion check dams are filled with sediments and covered by biological plants like vetiver grass, elephant grasses.

In the above consecutive pictures illustrating different photos taken at different times. As it is observed, the big stone taken as a reference frame is now covered with forests. And the area is showing the gradual change from time to time.

3.2.1.2 Spring source Status before and after implementation

Before the intervention of the project soil and water conservation, the gully was completely dry. And the top part of the soil that is very important and fertile for crop production was completely eroded. Hence, the bed of the gully was left with a hard internal argillaceous black rocky structure that looks hard and smooth during the rainy season but during the dry season it fractures from time to time, and while the heat of the sun in the day time and cooled condition during the night varies it easily weathered. Therefore; the bed of the gully breaks down and it was aggravating degradation. As can be observed from the photo below.



The photo was taken in October 2009



On the contrary; after the implementation of different techniques of soil and water conservations on the catchment treatments and gully reclamations integrated with biological soil and water conservation was done; the groundwater table of the hillside area is recharged. And the water sprouts out as spring and

new spring water developed. And its discharge was measured **42.3 lit** per second water was measured on September 27, 2011. and this water stays till **December** regularly running and on some parts of the gully as pond form ponded till **June**. It is easy to compare the two photographs taken in different years, the previous one is dry and the plantation of the biological plants very young. While the recent one with matured biological and spring developed.



This shows children washing their body from the spring developed and hand pump photo at the downstream. Deep trench Photo taken in September 15/2011 & seasonal spring developed





Photo: demonstrating water status at the downstream

Figure 4, Spring source Status before and after implementation

3.2.1.3. Gully size status before and after implementation
The size of the gully before the construction/implementation/ of different SWC techniques was illustrated in the table below.

Table 2. The size of the gully before and after SWC

S.n	Previous status (size of the gully)			Current status (size of the gully)			Remark
	Gully depth	Gully Width	Gully length	Gully depth	Gully Width	Gully length	
	3m	12m	975m	1m	12m	956m	14,000m ³ sediment accumulated

Source filed measurement

As it is observed in the above table, many parts of the gully are all most filled. The average gully depth is changed from 4 m to 1m (i.e the difference of two meters is filled with soil that comes via the flood). But on some specific areas/parts/ of the gully there are all most 100% reclaimed. The total area of the gully is about 0.78ha and this all is serving as a source of forage production to the animals (no any part of the gully is free).

After the implementation of different techniques of physical soil and water conservations on the catchment treatments and gully reclamation activities integrated with biological soil and water conservation activities, observe photos bellow.

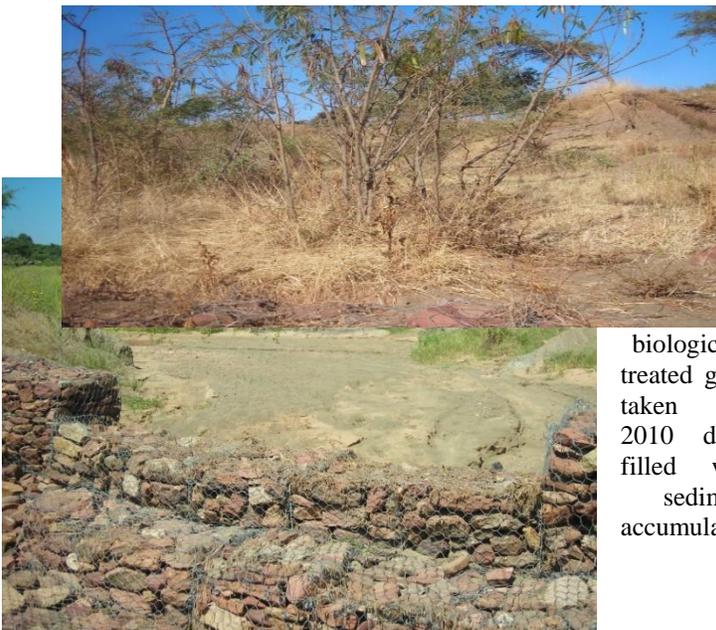
The photo was taken:- in September 20/2009, gabion check



The photo was taken:- in September 26/2011

3.2.1.4. Status of the surrounding cultivated land before and after implementation

Before the implementation of the soil and water conservation activities, the surrounding cultivated land was diminished by the expanding gully degradation. Different tunneling erosions were formed at the bank of the gully as the gully was actively expanding. That is big holes were formed or developed at a distance of 3m to 10m far from the bank of the gully to the center of the surrounding cultivated land. As a result of this, the product of the land was declined from time to time. And is, therefore; the cultivated land as a whole was under risk condition unless those treatment activities were implemented. However; after implementation of these activities discussed above, the tunneling, rill, and sheet erosions are ceased out. There fore; the land is now in good condition due to different physical SWC techniques on catchment treatment, on gully reclamation integrated with biological conservation activities. Hence in July and at the beginning of September, different temporary springs at different plots that did not appear previously have been developed. In other words, moisture is conserved **in situ** after the



biologically treated gully taken in 2010 dams filled with sediment accumulated

implementation of integrated SWC activities emphasized biological plantation practiced
Photo Status of gull in the cultivated land Seasonal spring water developed at the cultivated land

As it is observed from the above photos, the rain is highly harvested and left on the ground. These types of techniques and others like percolation ponds, deep trenches, simple trenches, hillside terraces, e.t.c. retained the water that comes from the upper catchment and reduces the runoff that aggravates degradation. Hence, in turn, reduces degradation and results in land stability, sprig development as seen in different photos under different subheadings.



3.2.1.5. Societies/community/ benefit before and after implementation

Before the implementation of activities of the project SWC, the members of the community have no benefit from the gully. However; after the implementation of different interventions, the community's benefit is increasing from time to time. Some of the major benefits are:-



a) Forage development: - before the implementation of the gully reclamation, the gully was bare land or free rocky spaces. But after the implementation of these activities, different grasses like vetiver grasses, elephant grasses, and other mono plants like "Leuceania" and "Sesbania" are developed inside the gully. Hence; these all are serving as a source of forage for the animals in addition to conservation purposes.

The photo was taken in January 2009
Photo taken in Dec. 2011



b) *Water availability:* -previously, the gully, and the surrounding land did not have any water availability. But after the gully reclamation activities are done, the community gets benefits of water inside the gully as ponds for their animals and one hand pump for the community as drinking water source respectively. These all are the results of the rain harvested at different parts of the catchment recharges the groundwater and this makes shallow the water table and easily available the water for human and animal benefits. The hand pump bellow was constructed in 2009



Photo of a hand pump for drinking water

Photo of ponds developed & serving as a water source for cattle developed



3.2. Economic Impact

Here the impact of soil and water conservation structures on yield status was assessed in tabia E/Chiwa (Mizraf watershed). In the watershed in concern; the yield of the cultivated land on crop production in the previous three successive years 2006,2007,2008 farmers told their experience barley and wheat were 18Qtl / Ha, Teff 16 Qtl / Ha; whereas on the other recent years(i.e. in 2009 and 2010) improved their land productivity to 26Qtl / Ha Barley and wheat, to23Qtl/Ha Tef .15.5Ha of land was taken in the year 2010 to assess the impact of the terraces on yield product improvement with in the same catchment characteristics around the gully reclamation treated on both sides. And 12 farmers were interviewed to see the amount of yield they harvested before and after the implementation of different SWC structures.

3.2.1 Crop production

The impact of SWC on grain yield before the implementation of the SWC structure and after implementation was assessed. And its effect is discussed in the table below.

Tables 3: Impact of SWC structures after the construction of terraces.

S/ n	Sowed crop type	Before implementation of SWC 2007		After the implementation of SWC in 2010					Yield difference In Qtl	
		Amount harvested in Qtl/ Ha grain	Straw(bale)	Amount harvested in Qtl/ Ha grain	Straw(bale)	Ha covere d	Total harvested Grain Straw(bale)	Grain Qtl	Straw(bale)	
1.	Wheat	18	40	28	84	3	84	252	30	132
2.	Barley	18	32	28	65	6	168	390	60	198
3.	Teff	16	45	25	92	6.5	162.5	598	58.5	306
	Total	52	117	81	241	15.5	414.5	1240	148.5	636

the above table tried to compare the productivity difference and there is an assumption that the crop type sown and harvested in 2010 may or may not be sown in 2007. But crop types sown in 2010 were taken as initial for assessment. In addition to this 6.5 ha of land from the cultivated land was also under fallowing process and there was also in the year 2007 some part of the cultivated land may or may not be fallowed, the products of 2007 are also an assumption the farmers themselves told but there is no recorded data. It has these types of limitations

Photo of crop production statuses taken in August30/2011



3.2.2. Forage Development

Forage grasses, shrubs, and trees have been planted and sowed to reclaim the gully (i.e. vetiver grasses, elephant grasses, S.sesban, e.t.c.). Now the community using the reclaimed gully, as a source of feed for their livestock through the cut and carries or controlled grazing system.

In addition to the above ideas discussed physical appearance investigation was performed and some farmers interviewed if there are changes on the size of their animals (i.e.

comparing and contrasting the size or weight of the livestock before and after gully treatment) there is much difference in weight and physical appearance; because they feed their livestock forage from the treated gullies. Besides that the farmers harvest grass three times a year including the summer products in September, February and June; and about 45 bales of grass were collected per a period and distributed 20 beneficiaries. Hence, each farmer feeds two months per year from the grasses harvested.

Table 4: Amount of forage collected and distributed per House Hold

s/n	No of grass collection time	Amount of forage collected (in Bales)	No of forage bales distributed per House Hold	No of beneficiary (Households)	of Remark
1.	September	140	7	20	Including grasses collected from the area closure
2.	February	45	2.25	20	From gully forage
3.	June	40	2	20	From gully forage
	Total	225	11.25	20	



Figure 5: The above biological treated gully used as a source of feed for livestock

3.3. Social impacts

People have changed the cultural outlook on conservation interventions. Before the intervention of SWC activities, people were reluctant to work on closing the land and animal control mechanisms on free grazing. This is because they hesitated and believed that the government would have owned, and will take in the future time. However; now a day people participating in closing the land from animals and discuss themselves, do SWC activities in almost 20-24 days per month. Now, they capacitated and they carry out SWC activities by themselves.

IV. CONCLUSION AND RECOMMENDATION

This study assessed the impact of various SWC measures implemented for land Degradation, Spring source, Gully size, Status of the surrounding cultivated land, and crop production productivity in Mizraf watershed, northern Ethiopia. The study indicated that there has been a success in maintaining and improving land resources, viz. soil, water, vegetation, and moisture due to the implementation of SWC measures. Many issues need to be improved on the existing SWC measures, such as continuous maintenance and follow up of physical SWC structures, appropriate spacing. Additionally, stabilizing physical SWC structures by planting multi-purpose grasses/plants and integrating SWC practices with biological conservation measures, in all parts of the watershed landscape to restore degraded land to its full potential and to be sustainable. More efforts should be directed towards increasing the water retention capacity and improving the organic matter content of the soil, along with the restoration of flora and fauna for ecological and economic benefits in many parts of the watershed.

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The Relationship Between Service Quality And Customer Satisfaction

"Applied Study on Private Telecom Services in India"

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Abstract: service quality is one of the most effective tools to gain customer satisfaction and loyalty. This study aimed to examine the relationship between service quality and customer satisfaction on private telecom sector in India. The study based on primary and secondary data, a total of 310 customers of the private telecom sector companies were surveyed by applying a structured questionnaire. Statistical tools like Cronbach's alpha coefficient and correlation coefficients, frequencies and percentages, descriptive statistics analysis, correlation analysis are employed to assess the relationship between the dependent variable and independent variable. The results revealed that there is a significant relationship between service quality and customer satisfaction. This study contributes invaluable information for both academicians and managers for their theoretical and practical purposes.

Index terms: Service Quality, SERVQUAL, Customer Satisfaction.

1. Introduction:

Nowadays most organizations in their pursuit of best quality and lowest cost try to reach this end through products or services provided. Previously, the best mean to create competitiveness was to attain the total quality level in terms of production, but currently such a goal represents the first stage in a long journey due to the intense competition characterizing the marketplace. Therefore, any organization willing to increase profits is required to achieve customer satisfaction and to keep existing customers grateful, since recent studies point out to the fact that the attraction of new customers involves costs five times greater than the expenses incurred to keep existing customers. Meanwhile, the economic systems call for expansion in the present investment as a more effective strategy than the attempt to invest in new activities. Many studies have indicated that a 5% growth in customer satisfaction and loyalty can boost profits from 20% to 85% (Reichheld and Sasser 1990). Though, current research approves that customer satisfaction is not a guarantee for loyalty with a very fragile linkage between satisfied customers and the ability to remain with such customers when the variables of service quality exist Wittly and Hissan (1998). Moreover, no one controverts the importance of customer satisfaction for all business in the world. For example, the great goal of any organization is to make a profit and to survive in the business world forever, which could only occur if satisfied customers continue their purchase with this organization and transfer to loyal customers to patronize the organization. Over and above, recently customer satisfaction has been the focus of organizations for being the long-term source of profits with more emphasis placed on current customers rather than the attempt to attract new ones.

Service Quality has presented a revolution of philosophy from the traditional marketing concept that emphasizes the short-term transactional approach through the traditional marketing mix (product, price, promotion and place) to a long-term customer focused and mutually beneficial approach. Hence, organizations can accomplish higher financial performance, customer satisfaction, trust, and commitment (hsieh et al., 2002) which lead to customer loyalty (Henning-Thutau et al., 2001). Therefore, the organization should focus on providing high quality service to meet customers' needs and expectations (parasuraman et al., 1988) in order to obtain customer's loyalty. Consequently, product/service quality is an important mean to make a healthy relationship which leads to customer loyalty.

In terms of telecom sector reforms, the Indian telecom sector has experienced an enormous growth over the last few years. This has been augmented by the invasion of the foreign direct investment in this sector. India is emerging as the fastest growing telecom markets in the world that within 2020 India having the total number of telephone subscribers reached 1.18 billion, the number of wireless subscribers is over 1.17 billion, and the number of wireline subscribers is 20.58 million. ((TRAI)). So, Competition among existing player has also focused on both retaining their existing customers as well as attracting new ones. Thus, the telecom service providers should to increase their efforts on maintaining and enhancing the service leading to gain customers satisfaction and customers loyalty.

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2. Background to the Study

Over the past decades, unprecedented economic growth has been noticed in Indian telecom sector. Telecom sector is categorized globally as one of the deriving forces for overall economic development in a nation. In terms of Indian telecom sector, it is a major economic sector of national and regional wealth creation. It is the second largest sector in the world by number of telephone subscribers reached 1.18 billion, the number of wireless subscribers is over 1.17 billion, and the number of wire line subscribers is 20.58 million in 2020.

A vital strategy which has been adopted by the economic sector recently to face these challenges is to concentrate on creating a long-term relationship with the customer, thereby building customer loyalty. These days, businesses are transferring from the strategy of gaining a higher market share to a long-term and profitable strategy that seeks to obtain customer satisfaction and loyalty. The advantage for this is that satisfied customers purchase more from one organization over their competitors so that its business sales increase, and they gain stronger market position. The same satisfied customers many times transfer to loyal customers start to produce a positive word of mouth towards the organization that attracts more customers. Many previous studies (Andreassen & Lindestad, (1998); Caruana, (2002); Khan, (2012); Boshoff & Gray, (2004); Chen & Chen, (2007); Howat et al., (2008); Akbar & Parvez, (2009); Mosahab et al., (2010); Amin, (2016) have declared that customer satisfaction has a significant impact on loyalty. It means that organizations have to develop and apply strategies to satisfy the customers to gain their loyalty after some time. Researchers declared that a highly satisfied customer is almost six times more expected to reveal loyalty and thereby repeat purchase then recommend the product/service to friends and family. Also a noticeable proof is that customer satisfaction and loyalty can be a logical outcome for applying service quality of the firm (Wong & Sohal, (2002); Munawar Khan & Fasih, (2014); Ali et al., (2016). Thus, many businesses started focusing on developing and implementing service quality as a basic strategy to build a long-term relationship with the customer through gaining their satisfaction and loyalty.

In terms of telecom sector, the Indian telecom sector is being exposed to a severe competition from both domestic and foreign competitors. In this case, organizations have to formulate their missions around providing the best quality of service to their customers to secure loyalty and to save them from transferring to other competitors; especially, customers nowadays have a lot of choices to make their purchasing decisions. Over the last few years, during (IBEF) the telecom sector in India has experienced an enormous growth, as many players have entered to the industry. For example (Jio Company) that launched its services on 27 December 2015, and the later services were commercially launched on 5 September 2016. Jio company has the highest market share (32.56%) with 376.53 million subscribers. As a result of continuous competition among existing and new companies, telecom service providers should focus on maintaining and enhancing the quality of services to gain customer satisfaction.

3. Literature Review

3.1. Service Quality:

Quality has gotten a noticeable attention from academic researchers in the recent decades. In spite of the significance of service quality in the context of marketing, there is no credible definition of service quality or its dimensions to understand and measure.

Most of the definitions focused on meeting customer needs, for example, Babbar (1992) defines that "Quality of service is determined primarily by the individual customers through their perceived delivery for the service attributes that they expect". Lewis (1991) defined service quality as "a measure of how well the service delivered matches customers' expectations" or "providing the customer with what he/she wants, when he wants it, and at acceptable cost, within the operating constraints of the business, and providing a better service than the customer expects" (Lewis 1988, 1991). Wyckoff (1984) defined service quality as "the degree of excellence intended, and the control of variability in achieving that excellence, in meeting the customer's requirements". Besides, a number of definitions refer to the importance of the clients'/customer' expectations of quality compared to perceptions, for instance, many researchers such as Gronroos, (1982); group interviews conducted by Parasuraman, et al., (1985, 1988, 1991, 1994), Craman (1990); Teas, (1993); Cronin & Taylor, (1994); Idris & Morsy (1993) unambiguously advocate the thought that service quality, as perceived by consumers, stems from a comparison of what they feel service companies should offer rather than would offer (i.e., from their expectations) with their perceptions of the organizations' performance that are providing the services (i.e., from the actual service performance). Gronroos (1984) for instance, defined perceived quality as "the outcome of an evaluation process, where the consumer compares his/her expectations with the service he/she has received. Furthermore, some authors described service quality as a form of overall evaluation of a product, similar to attitude (Parasuraman, et al., 1985, 1988; Bitner, 1990; Bolton & Drew, 1991; Cronin & Taylor, 1992) and this attitude is related, but not equivalent to satisfaction. For example, Parasuraman, et al., (1988) summarized perceived service quality as "a global judgment, or attitude relating to the superiority of the service"; it is shown as the degree and direction of discrepancy between customers' perceptions and expectations. Perceptions are defined as consumer's beliefs towards the received or experienced service (Parasuraman, et al., 1985; Brown & Swartz, 1989; Teas, 1993), and expectations are defined as what consumer desires from the service provider (Parasuraman, et al., 1988). Moreover, Zeithaml (1988) saw perceived service quality as "the customer's assessment of the overall excellence or superiority of the service". From Mattson's (1993) point of view service quality is "a creation of value for the customer". According to Edvardsson's (1998) definition, quality is "satisfies needs and meets expectations, those of the customers, employees and owners".

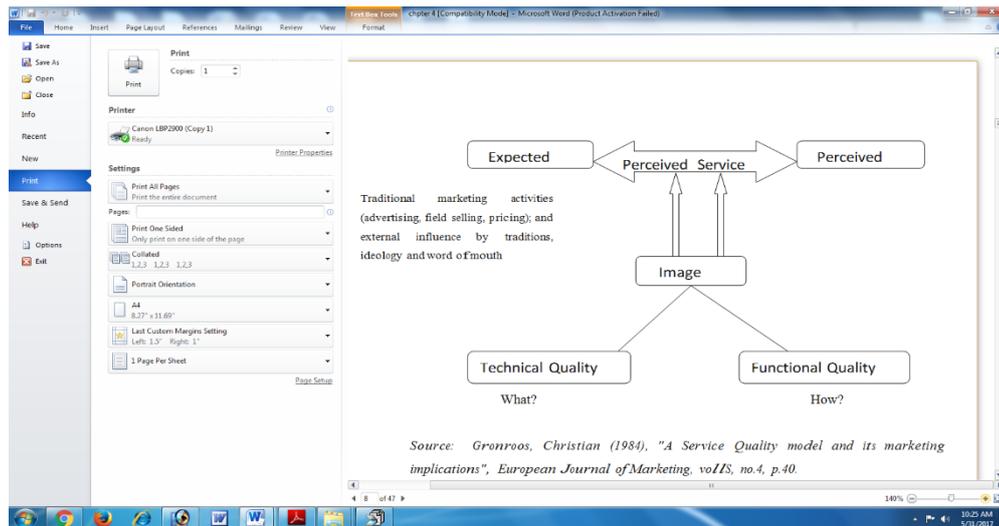
3.1.1. Models of Service Quality

As declared before, service quality has been the subject of remarkable enthusiasm by both practitioners and academic researchers in recent years. There are theoretical frameworks of the service quality models which are the most used in the service quality research. The European approach is used to be described as the Nordic school and originates from Gronroos' works (1982, 1984), the North American approach which is developed by Parasuraman, et al. (1985, 1988).

3.1.1.1. The Nordic Perspective on Service Quality

Gronroos (1982, 1983, 1984), who is the most productive contributor of the Nordic School, has undertaken research that led to the development of a service quality model. He conceptualized service quality as the outcome of the comparison between expected service and perceived service, and claimed that perceived service quality is dependent on these two variables, expected and perceived service. Gronroos (1983, 1984) identified three components of service quality; technical quality, functional quality, image (see figure (1)). The three components are explained as following:

Figure (1): Nordic Perspective Model



Source: Gronroos, Christian (1984), "A Service Quality model and its marketing implications 'European Journal of Marketing, vol.15, no.4, p.40.

3.1.1.2. North-American Perspective on Service Quality (The Gap Analysis Model)

The North- American perspective on service quality is based on the researches of Parasuraman et al. (1985, 1988). They proposed that quality estimations were based on a comparison of consumer expectations of what they should receive with consumer perceptions of what they did receive. In other words; the gap analysis model defines quality as the difference between customers' expectations and perceptions of the service delivered. The model identifies a set of essential gaps that exist relating to executive perceptions of service quality and tasks related with service delivery to customers. Thus, the gap model is intended to be used for analyzing sources of quality problems and for helping managers to understand how service quality can be improved Parasuraman et al. (1985, 1988). According to the American perspective Parasuraman, et al, (1985) service quality gaps are measured by the differences between the two scores-performance-minus-expectations (P-E) (see figure (2), a positive result indicates a positive measure of service quality, they also suggested five possible gaps as following:

- Knowledge Gap (Gap 1) refers to the difference between customer's expectation and management perception.
- Standards Gap (Gap2) refers to the difference between management perception and the quality specifications set for service delivery.
- Delivery Gap (Gap3) refers to the difference between the quality specifications set for service delivery and the actual quality of service delivery.
- Communications Gap (Gap4) refers to the difference between the actual quality of service delivered and the quality of service described in the firm's external communication
- Service Gap (Gap5) refers to the difference between customer's expectation of a service and perception of the service actually delivered.

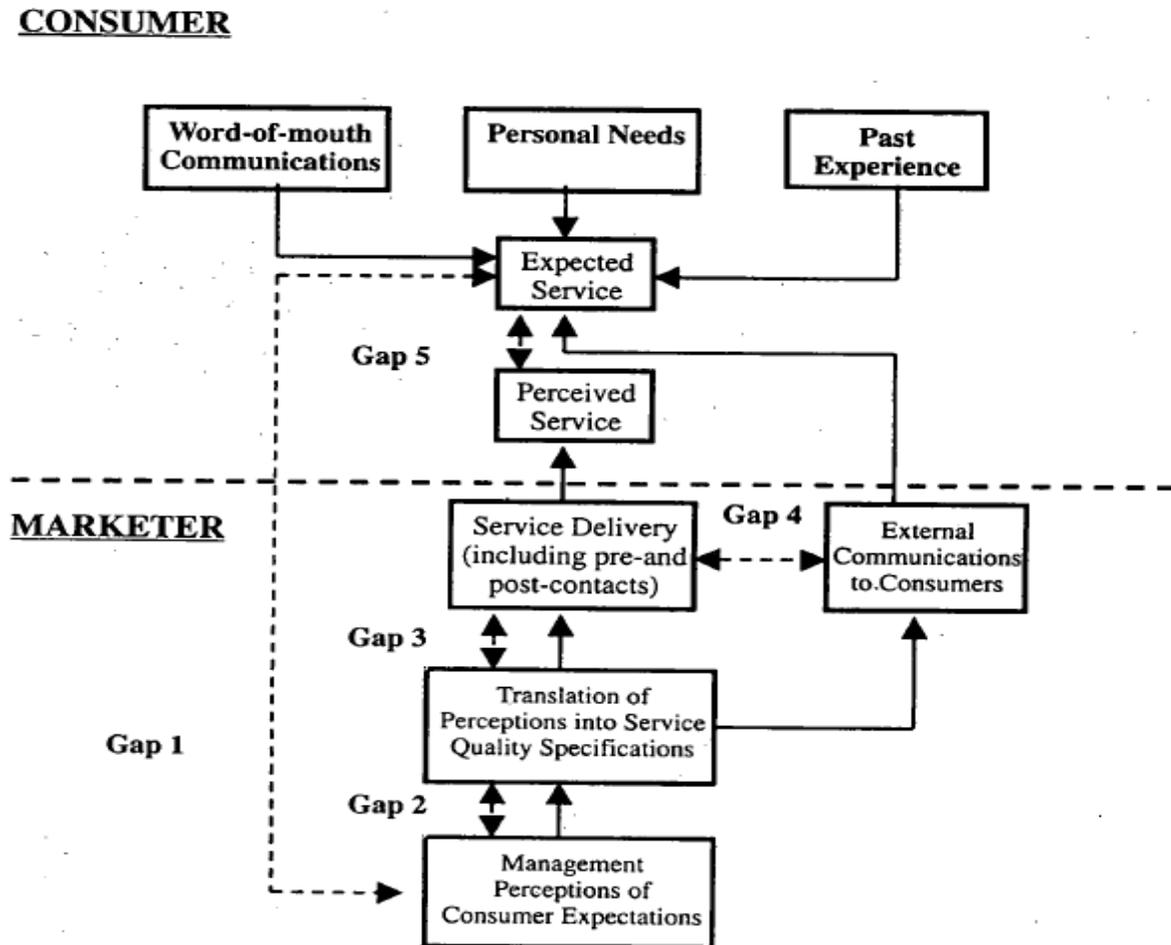
According to this model, service quality as perceived by a customer depends on the size and direction of Gap 5 which in turn depends on the nature of the gaps related with the design, marketing, and delivered services, i.e. Gaps 2, 3 and 4.

In this regard, Parasuraman, et al., (1985) proposed ten dimensions to determine service quality that related to characterizes of the service: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding (knowing) the customers, and tangibles. Therefore, they propound that the differences between perceived performance and expected

performance of these ten dimensions determine overall perceived service quality. Later Parasuraman, et al., (1988) were reduced to five dimensions.

Due to the emphasis on differences between expectations and perceptions, this type of model is also identified as a disconfirmation model. Also, Parasuraman et al. (1988) has suggested that SERVQUAL may be used to: (1) track service quality trends over time; (2) compare an organization with its competitors; and (3) categorize customers into perceived quality segments based on their individual SERVQUAL scores.

Figure 2: Gaps Model of Service Quality



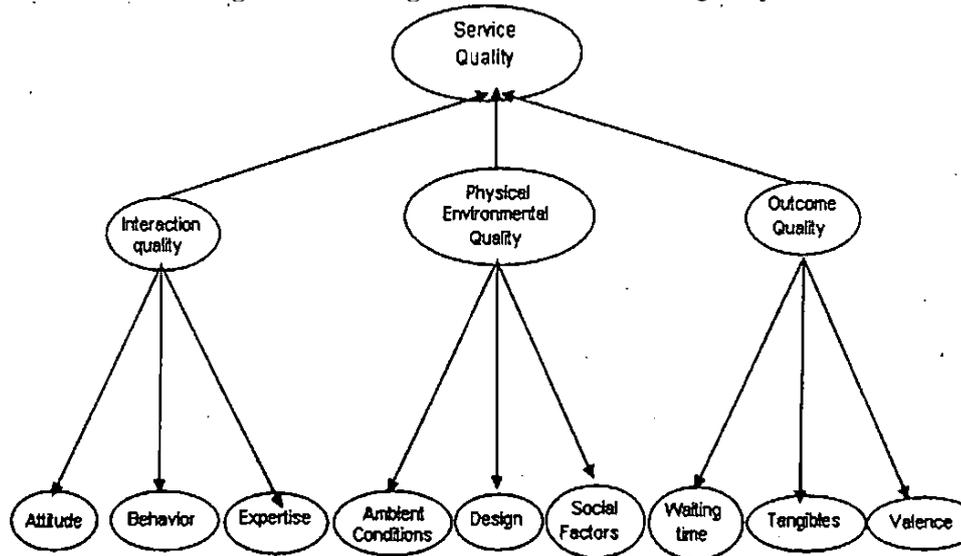
Source: Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *the Journal of Marketing*, 41-50.

3.1.1.3. The Integrating Model of Service Quality

Brady and Cronin (2002), proposed a framework that pursued to integrate the Nordic and North-American perspectives of service quality models which presented in figure (3). In particularly, this model depended on the work of Gronroos (1984), Rust and Oliver (1994), and Parasuraman et al. (1985). Brady’ and Cronin (2002) presented a hierarchical approach to the evaluation of services experience by consumers.

According to Brady and Cronin (2000) there are three direct determinants of perceived service quality: interaction quality, the quality of the physical environment, and the outcome quality, each one has three sub dimensions. Interactive quality is shown as being a function of how employees’ attitudes, expertise, and behaviors are perceived to influence the quality of a service interaction. The service environment quality is conducted to be a function of the design and layout of the environment, the social factors and the ambient conditions (the atmosphere that is perceived). The outcome quality is held to be a function of tangibles, waiting time, and valence. In addition, Brady and Cronin have exposed their model to empirical analysis, and the results provided support for its validity. Further, they have succeeded in consolidating multiple service quality conceptualizations into a single, comprehensive, multidimensional framework with a strong theoretical base.

Figure 3: An Integrated Model of Service Quality



Source: Brady, M.k., and Cronin, 3.3. (2001), “Some New thoughts on conceptualizing perceived service quality: A hierarchical approach”, *Journal of Marketing*, vol.65, July, p.37.

3.1.2. Dimensions of Service Quality

Over a decade ago, researches in service quality started to grow particular at the beginning of 1980s in different parts of the world by academic researchers and practitioners leading to several dimensions of service quality. The dimension of service quality is an issue that is currently unresolved in the literature. For example, Sasser et al (1978) emphasized the physical aspects of service quality by the level of materials and facilities, and added a personnel element as a third dimension of service quality (Abdelaziz, 2001). However, Lehtinen & Lehtinen (1982) have illustrated the dimensions of service quality by two approaches; first is a three-dimensional quality approach which refers to physical quality (from the environment), institutional quality, and interactive quality. Interactive quality involves the interactions between service provider and customers as well as between customers themselves. Institutional quality, includes a service company’s image, and reputation while physical quality, or instrumental quality involves the physical aspects associated with service such as facilities, such as equipment and building. Second is a two-dimensional quality approach which divided service quality to process quality judged by customers during the service, and output quality that judged by the customer after the service is performed. Furthermore, the first approach which contains the three dimensions is empirically tested in another study by Lehtinen et al, (1996) in three service settings. As mentioned before, Gronroos (1984) introduces a trichotomy of service quality dimensions based on the technical quality, functional quality, and image, that

Supported the results of the trichotomy of service quality dimensions of Lehtinen and Lehtinen. The three-dimensional approach of Gronroos has been assumed in an empirical study containing the executives of Swedish service firms who had participated in a series of service marketing seminars. Additionally, this model has been used quite frequently in researches (e.g. Richard and Allaway, 1993; Sweeney et.al, 1997). Mels et.al (1997), studied the classification of service quality dimensions (technical/functional quality) by using similar dichotomy such as “extrinsic”, and “intrinsic” quality. The intrinsic service quality involves what Gronroos called functional quality. The extrinsic service quality involves the technical quality or the outcome quality.

Presently, the most well-known model of service quality is SERVQUAL. SERVQUAL originally contained ten service quality dimensions (reliability, responsiveness, competence, courtesy, communication, credibility, access, security, understanding / knowing the customer, and tangibles), but using factor analysis, they were subsequently reduced to five dimensions (three original dimensions: tangibles, reliability, and responsiveness. The two combined dimensions containing assurance combining communication (competence, credibility, courtesy, and security), and empathy combining access. (Parasuraman et al.1988). The definitions of these dimensions as following:

- Tangibles: physical facilities, appearance of personnel, equipment.
- Reliability: ability to provide the promised service dependably accurately and dependably.
- Responsiveness: willingness to serve customers and provide prompt service.
- Assurance: employees' knowledge and courtesy and their ability to inspire trust and confidence.
- Empathy: ability of the company to provide caring and individualized attention to its customers.

3.2. Customer Satisfaction

3.2.1. The Concept of Satisfaction

Satisfaction as a concept has been studied greatly in the literature; Rechild (1996) emphasized the role of satisfaction and its importance to give any company the major part for its success with customers. Anderson and Srinivasan (2003) considered

customer satisfaction as the positive response felt by customers towards their purchasing experience. Oliver (1997) defined satisfaction as “the consumer’s fulfillment response”. It is a judgment that a product or service provided (or is providing) at a pleasurable level of consumption- related fulfillment, including levels of under-or-over fulfillment. Oliver’s definition makes an obvious distinction that has been unnoticed by several researchers in previous literature. It mentions the “consumer” rather than the “customer” as the word customer means the buyer, which at times may not be the direct user of the product or service and may be the one who pays for the product. From this distinction, the satisfaction as a concept should include only those who have had a direct involvement with the product or service, as they are the ones who are in a position to judge whether or not the product or service was satisfactory. This key distinction makes satisfaction more explicit and dependable when it is used in relation with other marketing concepts, as it leaves no area for mistakes or misinterpretation when dealing with the word customers versus consumers. However, this understanding changes due to specific industry under study

Satisfaction has been defined by Fecikova (2004) as an emotional response resulting from comparing expected and actual performance. The outcomes of Satisfaction differ by specific context as:

- Satisfying the needs and the desires of the customer (Besterfield ,1994)
Resulting in delight (Kanji, 2002)
- Giving Pleasure (Fecikova, 2004)
- Satisfaction can be a mere result of things not going wrong (Fecikova, 2004)

Sharing the same view, Roberts- Lombard (2009), described satisfaction as the degree to which the performance of the product or service matches up to the expectation of the customer. Satisfaction definitions in most of the studies emphasized the significance of expectations (Churchill& Surprenant, 1982; Oliver, 1980; Tse& Wilton, 1988). One can say that, customers usually form their expectations due to their desired needs, values, past experiences and extrinsic indications about the product. Therefore, the customer’s perception of what the product or service provider can actually provide forms these initial expectations. Upon evaluating the difference between what was expected and what was actually experienced, the consumer forms and expresses his emotional response. Thus, satisfaction depends on the customer’s judgment. And their perception influences the judgment for both the delivered service and the expected quality (Hu, Kandampully& Juwaheer 2009). Balaji (2009) added that there is a direct link between perceived quality and total satisfaction. Furthermore, perceived quality is affected by initial expectations and overall brand choice. It plays a vital role in the customer’s evaluation of satisfaction (Grounaris, Tzempelikos& Chatzipanagiotou, 2007).

3.2.2. Customer Satisfaction Theories and Models

Depending on the previous literature that studied customer satisfaction, there are two main categories of customer satisfaction models. These models are categorized as Macro-models and Micro-models. The Micro-models focus on the elements of the satisfaction construct itself in isolation from any outside influences. While the Macro-models study the place of the satisfaction construct within its external environment. These models come from a several literature of marketing research. Other related marketing researches involve models that integrate the concept of customer satisfaction in a network of related concepts as value, quality, complaining behavior, and loyalty.

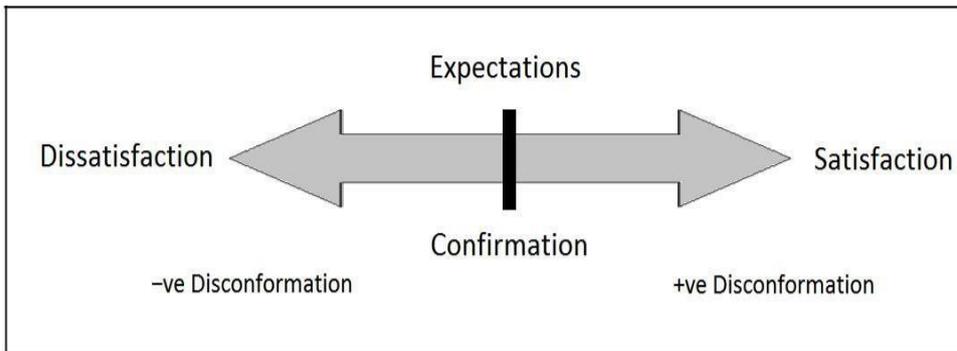
3.2.2.1. Micro Models of Customer Satisfaction

Oliver (1980) examined the concept of satisfaction in the service industries, and constructed the most prevalent models upon the “Disconfirmation of Expectations Paradigm”. This model discusses that actual performance is measured against the customer’s initial expectations to assess the state of satisfaction. Chiou& Spreng, (1996) defined “disconfirmation” as the calculation of “difference scores” (explicitly, the difference between a rating for expected performance and a rating for perceived performance). Sharma &Ojha (2004) also ensured that disconfirmation is "the difference between the post-purchase and post-usage evaluation of product or service performance and the expectations held prior to the purchase” (Sharma& Ojha, 2004).

Confirmation occurs when the performance matches up to the initial expectations; no more or less (Erevelles and Leavitt, 1992). On the other hand, “negative disconfirmation” occurs once actual performance is perceived to be worse than what was expected of the service initially. Here, the customer is dissatisfied, and the trend to retune to purchase the product or service in the future is rare (Zammit, 2000). When the actual performance is perceived to transcend the customer’s initial expectations “positive disconfirmation” occurs, and the consumer is considered highly satisfied or even “delighted”. Such positive experiences reinforce the tendency of the consumer towards the brand

The customer’s comparison standards can come from several sources that can vary widely by individual, product/service type, and situation and are influenced by values, needs, past experiences, and extrinsic cues about the product (Woodruf and Gardial, 1996). So, the performance is either below or above par, and for that reason the evaluation process results in either a positive disconfirmation response (feelings of satisfaction) or a negative disconfirmation response (feelings of dissatisfaction) as shown in figure (4) below

Figure 4: Disconfirmation of Expectations Theory



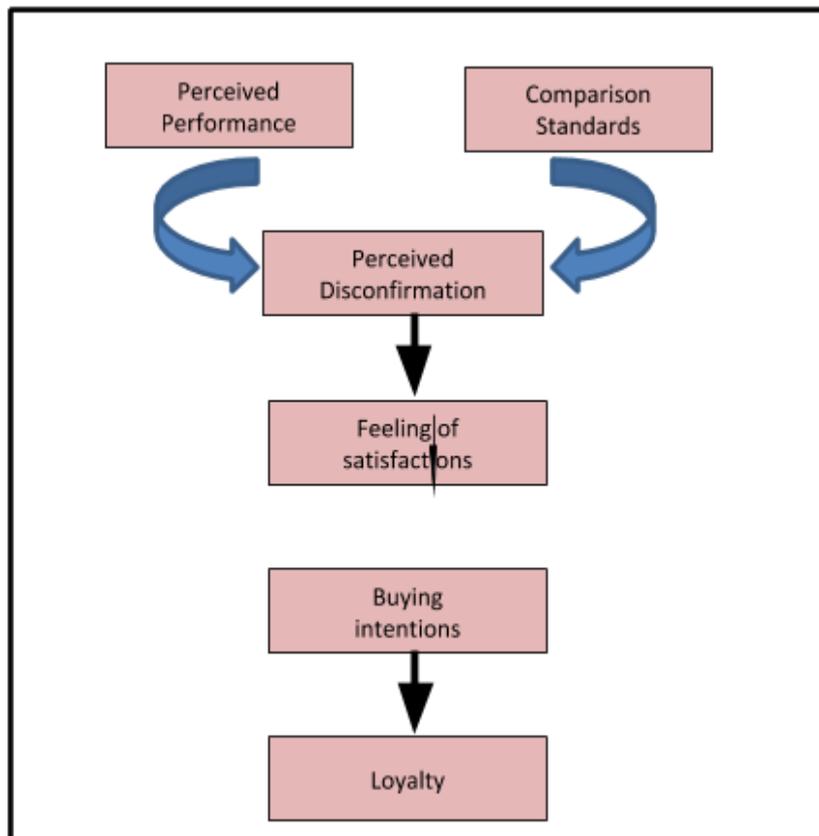
Another model was developed in 1984 by Kano. Kano model divides product or service attributes into three diverse categories: threshold attributes, performance attributes and excitement attributes. The “threshold attributes” are the basics of the product that present the minimum requirements which must be shown in the product or service, and will cause dissatisfaction if not fulfilled. Nevertheless, if they are fulfilled and exceeded, they will not produce satisfaction. (Furlan& Corradetti, 2010)

“Performance attributes” are unique features that increase customer satisfaction as additional features to be beyond the basic expectations, but if the performance attributes are weak, customer satisfaction will be reduced. Performance features are unfamiliar service level that differentiate the organization to gain a competitive edge in the market. On another side, the attributes that will produce delight and inspire loyalty when delivered are “excitement attributes”, but these attributes will not produce dissatisfaction if they not occur in a product or a service. Excitement attributes represent the features that customer can’t expect, but customer can receive some of these features as a bonus. (Furlan&Corradetti, 2010) Odindo and Delvin (2007) mentioned a similar study

Conducted by Johnson in 1995 to examine service quality in the UK organizations. Three categories of factors which have an effect on satisfaction were identified from the outcomes of the study. These categories are: hygiene factors, enhancing factors, and dual threshold factors. “Hygiene factors” are the expected aspects that present in a product or a service, and do not contribute in satisfaction. “Enhancing factors” are the features that lead to satisfaction, but the absence of these features doesn’t produce dissatisfaction.

Another study was published in 2003 by Fredrick Flertzberg in the field of psychology to evaluate the employee satisfaction and motivation. The researcher mentioned this study because it can be used in understanding the general concept of satisfaction in other fields. Satisfaction and dissatisfaction are viewed as separated constructs in this study. That is to say factors that lead to satisfaction are separated from factors that lead to dissatisfaction. It means that the absence of the factors of dissatisfaction doesn’t indicate that the customer is satisfied; although, it means that the customer is “not- dissatisfied”. Thus here, satisfaction and dissatisfaction can be conceptualized as dual continuum as shown in the figure (5)

Figure 5: Hertzberg’s Satisfaction/Dissatisfaction Dual Continuum



Source: Adapted by the researcher from Hertzberg (2003)

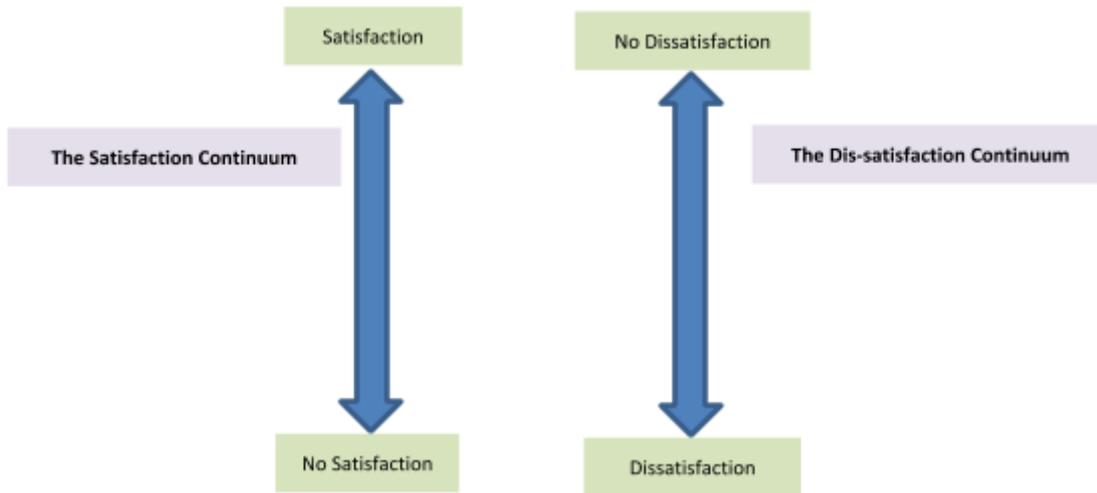
3.2.2.2. Macro Models of Customer Satisfaction

In macro-models of satisfaction, the researchers studied the concept of satisfaction within the external environment, and its relationship with other variables and constructs. Most of macro-model theories declared that satisfaction and dissatisfaction are separated concepts, and they are influenced by the existence of other attributes. These attributes are categorized by their effect on the states of satisfaction and dissatisfaction. So, to be “not dissatisfied” means that the customers are neutral; it doesn’t mean the customer is satisfied. Thus, (Shahin et al., 2011; Kuusik, 2007) stated that the previous introduction could be the key for solving the secrecy of satisfaction- loyalty relationship, and claiming that not all satisfied customers are loyal. That is to say, the relationship between customer satisfaction and loyalty could be non- linear

The most basic form of macro-models is Woodruff and Gardial’s 1996 “Traditional Macro- Model of satisfaction”. This model concentrates on satisfaction in a raw form as a result of the disconfirmation that happens between perceived performance and expectation. It connects raw satisfaction to its outcomes as loyalty.

According to Odindo and Delvine (2007), the items of the model are considered the five most common variables by most satisfaction measurements models. These five items can be modified as the antecedents and outcomes of the “Disconfirmation Theory” as presented in figure (6)

Figure 6: The Antecedents and Outcomes of the Disconfirmation Theory



Source: Author constructed based on literature

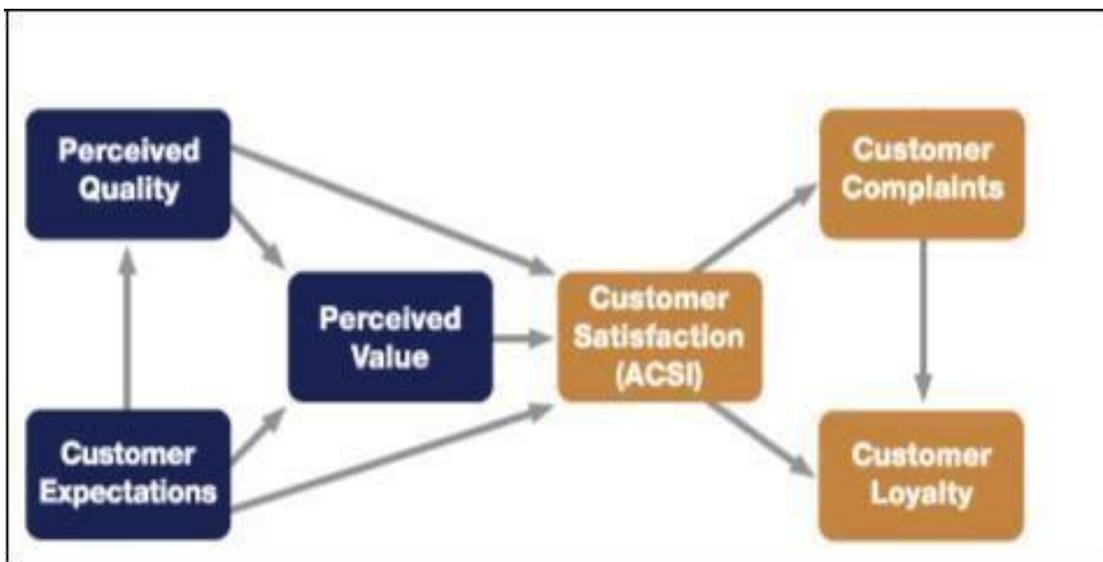
3.2.3. Measuring Customer Satisfaction

Due to the discussion above for the nature of satisfaction, most researchers used the gap or discrepancy between expectations and the perceived performance as a conductor of the satisfaction degree.

Many countries have developed national customer satisfaction indices. The most significant was the Swedish customer satisfaction barometer (SCSB). This barometer was developed by Fornell in 1992. Then he has developed the American customer satisfaction index (ACSI) in 1996 (Andreassen & Lindestad, 1998)

The ACSI has been developed in the University Of Michigan Ross School Of Business by Claes Fornelle. Many organizations have applied it as a macroeconomic measure of consumer behavior to measure their customers' satisfaction (Gerpott et al., 2001). ACSI model is a cause-and-effect model as shown in figure (7) in which it covers the drivers and antecedents of satisfaction on the left side: customer expectation, perceived quality, and perceived value. On the other hand, on the right side there are the outcomes of satisfaction: customer complaints and customer loyalty.

Figure 7: The ACSI Antecedents (Components) and Outcomes



Source: The ACSI Official Website 2013

The elements on the right and left are multivariable components measured by several questions that are weighted within the model. The arrows in figure (7) represent “impacts”. The model is self-weighting to maximize the impact of the three stated customer satisfaction determinants and components (on the left) on the ultimate outcome of customer loyalty.

4. Statement of Problem

For (telecommunication sector in India) to keep its maintenance and gain customer satisfaction and loyalty in the complex and competitive market of today they should pay more attention to apply service quality as a vital marketing strategy that help in recognizing the needs of their customers. Thus, it could be easier to meet their needs to achieve customer loyalty and retention, so

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consequently (telecommunication sector in India)) can save its market share. Accordingly, the statement of the problem can be stated in the following questions:

4. Research Questions:

4.1. Research Questions:

4.1.1. Research Question (1): Is there any significant impact of service quality on customer satisfaction?

4.1.1.1. Hypotheses of Research Question (1):

RQ1H01: There is no significant impact of 'price' on customer satisfaction.

RQ1H02: There is no significant impact of 'tangibles' on customer satisfaction.

RQ1H03: There is no significant impact of 'reliability' on customer satisfaction.

RQ1H04: There is no significant impact of 'responsiveness' on customer satisfaction.

RQ1H05: There is no significant impact of 'assurance' on customer satisfaction.

RQ1H06: There is no significant impact of 'empathy' on customer satisfaction.

RQ1H07: There is no significant impact of 'overall service quality' on customer satisfaction.

4.1.2. Research Question (2): Is there any significant difference in overall service quality (OSQ) across particular demographic attributes?

4.1.2.1. Hypotheses of Research Question (2):

Demographics play a very significant role in service quality studies (Mehta and Lobo, 2004). Following hypotheses have been formulated to address this research question:

RQ2H01: There is no significant difference in 'overall service quality' across gender.

RQ2H02: There is no significant difference in 'overall service quality' across age.

RQ2H03: There is no significant difference in 'overall service quality' across education.

RQ2H04: There is no significant difference in 'overall service quality' across income groups.

RQ2H05: There is no significant difference in 'overall service quality' across private telecom sectors.

4.1.3. Research Question (3): Is there any significant difference in customer satisfaction across particular demographic attributes?

4.1.3.1. Hypotheses of Research Question (3):

The hypotheses pertaining to this research question are given as under:

RQ3H01: There is no significant difference in 'customer satisfaction' across gender.

RQ3H02: There is no significant difference in 'customer satisfaction' across age categories.

RQ3H03: There is no significant difference in 'customer satisfaction' across education levels.

RQ3H04: There is no significant difference in 'customer satisfaction' across income groups.

RQ3H05: There is no significant difference in 'customer satisfaction' across private telecom sectors.

5. Research Objectives:

The general objective of this study is to explore the relationship between the application of service quality and customer satisfaction from the perspective of the customers of telecommunication sector in India.

Particularly the study seeks:

- ❖ To study the theoretical framework of service quality and customer satisfaction.
- ❖ To assess customers' expectations and perceptions of service quality.
- ❖ To measure the gap between customers' expectations and perceptions of service quality.
- ❖ To explore the differences among customers in overall service quality and customer satisfaction on the basis of their demographic attributes in telecom sector.
- ❖ To develop an integrated empirical model linked among service quality and customer satisfaction
- ❖ To propose suggestions, on the basis of results of the study, and ways to develop service quality in telecom sector to make overall telecom sector services more effective and efficient.

6. Delimitation of the study

- ❖ The sample of this study covers the customers of the private telecommunication sector in India that share the market share of telecommunication sector its competitors from public sector, so there is a need for another study that takes into consideration the whole telecommunication sector in India.
- ❖ The responses of the study have been collected from customers from Aligarh. The responses of the customers of Aligarh may vary from those of the rest of India.
- ❖ The customers of only the private Telecom Companies were selected for the present study. As a result, the generalization of the findings of the present study should be considered carefully.
- ❖ The present study has adopted six dimensions of service quality as suggested in previous studies taking in consideration the circumstances of the telecom sector in India. For this, a total of 31 parameters belonging to these 6 dimensions were used to measure the responses of the customers about service quality. There may still be a possibility of adding some new dimensions or some more parameters to the existing dimensions.
- ❖ Convenient sampling technique has been used for the collection of data from the respondents; thus, the generalization of the results should be looked carefully.
- ❖ The current study as all studies that are based on the primary data collected by the predesigned questionnaire suffers from the possibility of dissimilarity between what is recorded and what the truth of the respondents' answers is.
- ❖ It was not possible for the respondents to explain certain points related to the questions because the vital source of collecting the primary data was standardized and structured questionnaires.

7. Research Methodology:

7.1. Research Design

Analytical descriptive method has been used to sustain quantitative measurement and analysis. Data have been collected through different means which include:

Secondary resources: To introduce the conceptual literature of service quality and customer satisfaction, the researcher has depended on books, periodicals, articles, published papers and referred previous studies in different countries which have been conducted on the same subject, the Internet sites and the available electronic versions.

Primary resources: a questionnaire has been used as a primary tool for gathering data from the customers of private telecommunication Companies in order to analyze the qualitative and quantitative characteristics of the phenomena.

7.2. Study Population/Sample

The population of the study consists of the customers of private companies for telecommunications, which consists of well-known companies in India.

The sample consists of a total of (310) customers of private telecommunication sector in India. They have been requested to complete questionnaires (self-designed with the help of previous studies) that captured all the variables contained measures of the constructs of concern.

Sampling Method/ Sample Size:

The convenient sampling method has been used (310) Questionnaires administered to the respondents. All (310) questionnaires were dully filled and returned.

7.3. Data Collection Instrument:

The study employed a questionnaire as an instrument for data collection. The questionnaire consisted of three parts sections. The first part measures the demographic attributes of the respondents which include: gender, age, education, income, and company. The second part was designed to measure the respondents' expectations and perceptions of performance regarding the service quality of telecommunication sector with responses ranging from (1) strongly disagree to (5) strongly agree on five-point Likert scale. The third part consisted of five items designed to measure respondents' responses towards factors of customer satisfaction. 5 items were meant for the measurement of customer satisfaction as proposed by Woodruf and Gardial, (1996).

8. Data Analysis:

8.1. Methods of Data Analysis

The Statistical Package for Social Sciences (SPSS) was used to analyze the data. The following statistical procedures were used:

- ❖ Cronbach's alpha coefficient and correlation coefficients were calculated to assure the reliability and validity of study scales.
- ❖ Frequencies and percentages were calculated to describe the characteristics of the sample respondents.
- ❖ Descriptive statistics analysis was used to summarize the respondents' answers and to ranking the sub-items of each dimension.
- ❖ Correlation analysis was carried out to test the presence, strength and direction of the potential relationships among the variables of the study.

8.2. Reliability of the Scale

To check the reliability of the study instruments, cronbach's alpha coefficient was calculated. This coefficient generally varies between zero (for no reliability) and unity (for maximum reliability). Any values equal to or above 0.6 denote that the scale is of acceptable reliability. The closer the value is 1 the more reliable a scale.

Table (1) demonstrates that all reliability coefficient is acceptable, since they all exceed the benchmark of 0.60

Table (1): Values of cronbach's alpha coefficient

Scale Dimension	Observed Variables	Indicators	Reliability (Cronbach's alpha)
<i>Expectations of Service Quality</i>	Price	05	.866
	tangibles	05	.871
	reliability	06	.929
	responsiveness	05	.890
	assurance	05	.945
	Empathy	05	.966
<i>Perceptions of Service Quality</i>	Price	05	.832
	tangibles	05	.816
	reliability	06	.855
	responsiveness	05	.910
	assurance	05	.917
	Empathy	05	.921
<i>Satisfaction</i>		05	.880

8.3. Validity Analysis of the results

Internal consistency validity

To ensure the validity of internal consistency, the correlation coefficient between each item and the dimension to which it belongs was calculated. The results are shown in table (2)

Table (2): Item to Total Correlation Matrix (expectations)

PR	R	TAN	r	REL	r	RES	r	AS	r	EM	R
PR1	.785	TAN1	.820	REL1	.885	RES1	.866	AS1	.862	EM1	.861
PR2	.850	TAN2	.828	REL2	.849	RES2	.856	AS2	.890	EM2	.832
PR3	.848	TAN3	.845	REL3	.870	RES3	.871	AS3	.831	EM3	.870
PR4	.789	TAN4	.843	REL4	.881	RES4	.814	AS4	.922	EM4	.869
PR5	.784	TAN5	.866	REL5	.845	RES5	.814	AS5	.908	EM5	.832
				REL6	.817						

Source: SPSS 20.0 Output (based on Survey)

r: Correlation co-efficient, PR: Price, TAN: Tangibles, REL: Reliability, RES: Responsiveness, AS: Assurance, EM: Empathy.

** . Correlation is significant at the 0.01 level (2-tailed)

Table (3): Item to Total Correlation Matrix (perceptions)

PR	R	TAN	R	REL	R	RES	r	AS	R	EM	R
PR1	.767	TAN1	.783	REL1	.820	RES1	.843	AS1	.859	EM1	.876
PR2	.814	TAN2	.803	REL2	.834	RES2	.805	AS2	.884	EM2	.853
PR3	.849	TAN3	.870	REL3	.821	RES3	.882	AS3	.889	EM3	.870
PR4	.827	TAN4	.893	REL4	.836	RES4	.841	AS4	.855	EM4	.894
PR5	.831	TAN5	.791	REL5	.804	RES5	.872	AS5	.871	EM5	.858
				REL6	.757						

8.4. Characteristics of respondents:

The following table shows the main characteristics of the sample respondents.

Table (4): Characteristics of the sample respondents

Characteristics	N	%
Academic Qualification		
Diploma	45	22.5
Bachelor	102	51
High Education	53	26.5
Total	200	100
Career Level		
Top management	15	7.5
Middle management	57	28.5

	Low management & first line employees	128	64
	Total	200	100
Years of Experience in telecom sector			
	1- 5	63	31.5
	5- 10	94	47
	Above 10	43	21.5
	Total	200	100

It can be concluded from the table above that:

- The sample consisted of 200 respondents; of whom 45 have diploma (22.5%), 102 have bachelor (51%), and 53 have a high education (26.5%).
- Regarding career level; more than a half of the total sample units (64%) are in low management and first line employees, while (57%) of the respondents are in middle management, and (15%) are working in top management.
- In terms of years of experience in telecom sector, (31.5%) of the respondents have experience between 1-5 years, (47%) were between 5-10 years, while (21.5%) of the respondents their experience above 10 years.

9. Testing Hypotheses:

9.1. GAP Analysis of Service Quality

Quality is a comparison between expectations and performance (Parasuraman et al., 1985). Managers of service undertakings and researchers approve that service quality involves a comparison of expectations with performance (perceptions). Service quality is a measure of knowing whether the service level delivered is in line with customer expectations. Delivering quality service necessitates compliance with customer expectations on a regular basis (Lewis and Booms, 1983). In parallel with the previous philosophy, Gronroos, (1982) developed a model in which he claims that consumers compare their initial expectations of service with perceptions/performance of the service they are delivered with in assessing service quality. Smith and Houston, (1983) contend that satisfaction with services is allied to confirmation or disconfirmation of customer expectations. The quality that a consumer perceives in a service is a function of the magnitude and direction of the gap between expected service and perceived service (Parasuraman et al., 1985).

In the present study, service quality gap analysis has been performed with the aim to find out the shortfall (if any) - in service quality of the private telecom sector. However, in earlier empirical studies on telecom sector service quality, gap analysis has been performed to find out the level of service quality (Akbar& Parvez, (2009); Asif Khan et al., (2010); Ojo, (2010); Divya& Suresh, (2015); Dubey& Srivastava, (2016). Besides, paired sample t test has been performed to find out the significant differences in expectations and perceptions of service quality. Table (5) highlights the results of gap analysis performed in the context of service quality in private telecom companies (TC). As reflected in the Table (5), it can be asserted that these gaps were prominent and wide in private telecom sector which must be point of concern for them. By service quality shortfall, it is understood that perceptions of service quality are lesser than expectations of service quality. However, many prior studies on service quality in telecom sector have reported negative service quality gaps (Anjor et al., 2014; Chaudhary et al., 2014). Moreover, this study reports significant difference between expectations and perceptions of six of service quality dimensions ($t > 1.96, p < .05$).

Table 5: GAP Analysis (perception - expectation) (Private Telecom Sector)

Service Quality Attributes	No. of Items	Average Perception & (SD)	Average Expectation & (SD)	Average & Gap (SD)	t	Sig.
Price	05	3.41 (.867)	3.59 (.940)	-0.18 (.605)	2.52	.012

Tangibles	05	3.62(.859)	3.66(.813)	-0.04 (.629)	.690	.491
Reliability	06	3.59 (.861)	3.70 (.966)	-0.11 (.754)	1.57	.116
Responsiveness	05	3.65 (.888)	3.63 (.932)	0.02 (.671)	-.288	.774
Assurance	05	3.63 (.922)	3.54 (1.03)	0.09 (.760)	- 1.183	.238
Empathy	05	3.61 (.889)	3.50 (.966)	0.11 (.732)	-1.39	.164

Source: SPSS_20.0 output (based on survey data)

9.2. Testing Research Question (1): Is there any significant impact of service quality on customer satisfaction?

In order to find out the answer to this research question the following hypotheses have been formulated:

RQ1H01: There is no significant impact of ‘price’ on customer satisfaction.

RQ1H02: There is no significant impact of ‘Tangibles’ on customer satisfaction.

RQ1H03: There is no significant impact of ‘reliability’ on customer satisfaction.

RQ1H04: There is no significant impact of ‘responsiveness’ on customer satisfaction.

RQ1H05: There is no significant impact of ‘assurance’ on customer satisfaction.

RQ1H06: There is no significant impact of ‘empathy’ on customer satisfaction.

RQ2H07: There is no significant impact of ‘overall service quality’ (OSQ) on customer satisfaction.

Preceding the examination of impact of independent variables on dependent variables, correlation statistics between criterion and predictor variables have been calculated. Correlation is a statistical tool used to find out the level of association between variables. In view of this, correlation statistics calculated for this study are furnished in Table 6:

Table 6: Correlation Statistics

Dependent Variables	Independent Variables							
	Price	Tangibles	reliability	Responsiveness	assurance	empathy	OSQ	CS
CS	.317* *	.545**	.623**	.559**	.547**	.600**	.364**	1

Source: SPSS_20.0 output

** . Correlation is significant at the 0.01 level (2-tailed)

Note: CS: Customer Satisfaction, OSQ: Overall service quality.

As evident from the statistics in Table 6, there exists significant positive correlation between customer satisfaction and service quality variables. In addition, there also exists significant positive correlation between customer satisfaction and overall service quality. It is pertinent to mention that all the correlations are significant at 0.01% level of significance. This finding is consistent with the findings reported in earlier studies (Krishnan, 2013; Cronin and Taylor, 1992).

Table 7: Linear Regressions Customer Satisfaction by Service Quality Variables and Overall Service Quality

Attributes	Beta	T	Sig.	Adjusted R2	Model fitness (sig. value)	B	B Constant
Price	.316	16.693	.000	.099	.000	.307	2.380
Tangibles	.544	15.159	.000	.297	.000	.546	1.510
Reliability	.613	18.549	.000	.389	.000	.633	1.162
Responsiveness	.558	15.726	.000	.312	.000	.534	1.551
Assurance	.546	15.231	.000	.300	.000	.524	1.547
Empathy	.601	17.481	.000	.256	.000	.484	1.399
Overall Service Quality	.693	22.399	.000	.480	.000	.883	.293

Source: SPSS_ 20.0 Output (based on Survey data)

Dependent Variable/Constant: Customer satisfaction

Beta: Standardized coefficient

B: Unstandardized coefficient

Table 7 presents the results of linear regressions performed in order to find out the impact of service quality variables on customer satisfaction. As evident from the Table all the six attributes of service quality show significant positive impact on customer satisfaction ($t > 1.96, p < .05$). Moreover, Reliability ($t = 18.549, \text{Beta} = .613$) shows the highest impact on customer satisfaction. However, second in terms of range of impact is empathy ($t = 17.481, \text{Beta} = .601$) followed by price ($t = 16.693, \text{Beta} = .316$), responsiveness ($t = 15.726, \text{Beta} = .558$), assurance ($t = 15.241, \text{Beta} = .547$), and tangibles ($t = 15.159, \text{Beta} = .544$). These findings are in line with the findings reported in earlier studies (Sirajudeen, 2012; Shafeiha and Saeednia, 2011; Siddiqui, 2010). In addition, there is significant positive impact of overall service quality on customer satisfaction ($t > 1.96, p < .05$).

From the results presented in Table 7, it can be revealed that the models are fit and appropriate, as the corresponding probability values of F-statistics for the models meets the appropriate statistical criteria at 5 percent level of significance (i.e., the corresponding P-values are less than .05). Also, the value of R squared shows that the independent variable (OSQ) explains 48.0 percent of the entire variation in dependent variable (customer satisfaction). Therefore, predicted equations are formulated as here under:

- i. $\text{SAT} = 2.380 + .307(\text{price}) + \epsilon$
- ii. $\text{SAT} = 1.510 + .546(\text{Tangibles}) + \epsilon$
- iii. $\text{SAT} = 1.162 + .631(\text{reliability}) + \epsilon$
- iv. $\text{SAT} = 1.551 + .534(\text{responsiveness}) + \epsilon$
- v. $\text{SAT} = 1.547 + .524(\text{assurance}) + \epsilon$
- vi. $\text{SAT} = 1.399 + .484(\text{empathy}) + \epsilon$
- vii. $\text{SAT} = .293 + .883(\text{OSQ}) + \epsilon$

Note: SAT: Customer satisfaction, OSQ: Overall service quality.

However, Table 8 provides the summary of hypotheses:

Table 8: Summary of Hypotheses of research Question (1)

S.No.	Hypotheses	T	P	Result
RQ1H01	There is no significant impact of ‘price’ on customer satisfaction	16.693	.000	Rejected
RQ1H02	There is no significant impact of ‘tangibles’ on customer satisfaction	15.159	.000	Rejected
RQ1H03	There is no significant impact of ‘reliability’ on customer satisfaction	18.549	.000	Rejected
RQ1H04	There is no significant impact of ‘responsiveness’ on customer satisfaction	15.726	.000	Rejected
RQ1H05	There is no significant impact of ‘assurance’ on customer satisfaction	15.231	.000	Rejected
RQ1H06	There is no significant impact of ‘empathy’ on customer satisfaction	17.481	.000	Rejected
RQ1H07	There is no significant impact of ‘overall service quality’ on customer satisfaction	22.399	.000	Rejected

Source: SPSS_20.0 output (based on survey)

It can be figured out from Table 8 that all the null hypotheses are rejected given the results suggest significant impact of all the six service quality variables and overall service quality on customer satisfaction.

9.3. Testing Research Question (2): Is there any significant difference in overall service quality (OSQ) across particular demographic attributes.

RQ2H01: There is no significant difference in ‘overall service quality’ across gender.

RQ2H02: There is no significant difference in ‘overall service quality’ across age.

RQ2H03: There is no significant difference in ‘overall service quality’ across education.

RQ2H04: There is no significant difference in ‘overall service quality’ across income groups.

RQ2H05: There is no significant difference in ‘overall service quality’ across private telecom sectors.

Table 9: Summary of Hypotheses of Research Question (2)

No.	Hypotheses	T	F	P	Result
RQ2H01	There is no significant difference in ‘overall service quality’ across gender	2.444	-	.015	Rejected
RQ2H02	There is no significant difference in ‘overall service quality’ across age categories	-	3.487	.000	Rejected
RQ2H03	There is no significant difference in ‘overall service quality’ across education levels	-	8.651	.000	Rejected

RQ2H04	There is no significant difference in ‘overall service quality’ across income groups	-	1.605	.171	accepted
RQ2H05	There is no significant difference in ‘overall service quality’ across private telecom sectors	2.505	-	.013	Rejected

Source: SFSS_20.0 output (based on survey)

As pointed out in the Table 9 all five hypotheses are rejected owing to results indicating significant difference in overall service quality across all demographic attributes of the study except RQ₅H₀₄ indicating that insignificant difference in overall.

9.4. Testing Research Question (3): Is there any significant difference in customer satisfaction across particular demographic attributes.

The hypotheses pertaining to this research question are given as under:

RQ3H01: There is no significant difference in ‘customer satisfaction’ across gender.

RQ3H02: There is no significant difference in ‘customer satisfaction’ across age categories.

RQ3H03: There is no significant difference in ‘customer satisfaction’ across education levels.

RQ3H04: There is no significant difference in ‘customer satisfaction’ across income groups.

RQ3H05: There is no significant difference in ‘customer satisfaction’ across private telecom sectors.

In order to test the above hypotheses t test and one way ANOVA have been performed on the data. Moreover, the results are given in below Table 10:

Table 10: Summary of Hypotheses of Research Question (3)

S.No.	Hypotheses	T	F	P	Result
RQ3H01	There is no significant difference in ‘customer satisfaction’ across gender	-.415	-	.678	Accepted
RQ3H02	There is no significant difference in ‘customer satisfaction’ across age categories	-	6.995	.000	Rejected
RQ3H03	There is no significant difference in ‘customer satisfaction’ across education levels	-	12.818	.000	Rejected
RQ3H04	There is no significant difference in ‘customer satisfaction across income groups	-	2.324	.056	Accepted
RQ3H05	There is no significant difference in ‘customer satisfaction’ across private telecom sectors	-.948	-	.343	Accepted

Source: SPSS_20.0 output (based on survey)

As reflected in the Table 10 null hypotheses RQ3H01, RQ6H04, and RQ3H05 are accepted owing to results indicating insignificant difference in customer satisfaction across gender, income, and public or private sector. RQ3H02 and RQ3H03 are rejected reflecting significant difference in customer satisfaction across **age and education level**.

10. Conclusion

The study examines “relationship between the service quality and customer satisfaction in private telecom sector in India.” This study guided by objectives and 3 research questions, 17 hypotheses were proposed (7 hypotheses for research question 1, 5

hypotheses for research question 2, 5 hypotheses for research question 3). The dimensions of service quality in private telecom sector were identified from extent literature which includes (Reliability, assurance, empathy, responsiveness, tangibility, and price). Furthermore, research framework was developed relating the service quality and satisfaction. The overall service quality exerted a significant and a strong relationship with customer satisfaction.

11. Suggestions:

In line with findings of this study the following suggestions are offered to the telecom sector providers in India:

- Telecom companies need to improve their level of service quality in all 31 items, represented in 6 dimensions of service quality. More specifically, improvement of service quality must be made in price where the service quality gap was wider.
- Private sector telecom companies need to improve their service quality in 18 items, represented in 5 items of price, 4 items of tangibles, 6 items of reliability, and 3 items of responsiveness.
- The present study found that the service quality level in private telecom sector was less than the service quality level in public telecom sector. Thus, to augment their level of service quality private companies should strive to minimize the service quality gaps by offering affordable prices for customers, listening to customer requests and queries, keeping customer updated on new services, restructuring plans as the customers' life changes, providing services at the promised time, and responding well to the needs of customers.
- The study found that attributes empathy and reliability show the highest positive impact on both customer satisfaction. As these attributes are related with customers and employees, both public and private telecom sector should take more initiatives to construct training programs for employees in human skills.
- The study has found from literature review that there is a strong positive effect of customer satisfaction on customer loyalty; thus, telecom companies should make efforts to increase the satisfaction levels of their customers by improving the level of service quality. Thereby, the improvement in service quality is more likely to have significant impact on customer satisfaction and customer loyalty.
- The study found that customers of private telecom sector are likely to switch their service providers and say negative words of mouth about their service providers; thus private telecom sector should endeavor to improve their overall service quality level which in turn enhances the level of customer satisfaction. Thereby, customers of private sector can be expected to remain loyal to their service providers due to the significant impact of customer satisfaction on customer loyalty. On the other hand, public sector should make efforts to enhance their overall service quality level which will motivate their customers to towards building long relationship with their service providers.
- The study found significant differences in customer satisfaction due to demographic attributes of gender, age, education, and income. So, telecom companies should take care of the customers' needs and interest due to their belonging to different segments with a view to satisfy them and gain their loyalty.
- Telecom sector companies should maintain continuous improvement in service standards.
- Telecom sector companies should introduce new innovative products and services.
- Telecom sector companies should also focus on employee satisfaction by enhancing internal service quality (i.e., improve the standards of employees selection, development, rewards, and recognition). Consequently, employee satisfaction will lead to customer satisfaction and loyalty.

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Odonata Fauna of Riparian Habitats in Selected Areas of Luzon and Mindoro Region

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Abstract- Odonata is considered as potential indicator of environmental disturbances. Despite of great efforts in recording the Odonata Fauna of the Philippines in general, the Riparian habitats in Bataan/Subic Bay (Luzon) and Mt. Hinunduang/Baroc River Catchment (Mindoro) are still unexplored. Due to the continuous forest and freshwater habitat destruction, faunal survey of Odonata species is urgent. The present study surveyed selected riparian habitats in these regions in December 2015 to April 2016. A total of two hundred six species belonging to twenty genera (*Heteronaias*, *Brachydiplax*, *Diplacodes*, *Macrodiplax*, *Neurothemis*, *Orthetrum*, *Pantala*, *Potamarcha*, *Trithemis*, *Zycoma*, *Neurobasis*, *Cyrano*, *Rhinocypha*, *Agriocnemis*, *Ischnura*, *Pseudagrion*, *Teinobasis*, *Euphaea*, *Coeliccia*, and *Risicnemis*) were recorded and seven endemic species of the family Platycnemididae, Euphaeidae, and Calopterygidae were documented in both regions. From the collected specimens, one species under the family Platycnemididae is new to science but additional collection and evaluation are needed. The data collected contribute to the understanding of Odonata diversity and distributions in the regions and support future conservation and management strategies.

Index Terms- Odonata, Riparian habitats, Faunal Survey, Diversity and Distribution, Conservation.

I. INTRODUCTION

Order Odonata is an order of carnivorous insects, encompassing the dragonflies (Anisoptera) and the damselflies (Zygoptera) and they are among the most ancient of winged insects, which have existed since the Triassic (Kalkman et al. 2008). Adult odonates are medium to large size, conspicuous and/or brightly colored insects and are aerial predators hunting by sight (Kalkman et al. 2008).

Dragonflies are generally larger, and perch with their wings held out to the sides while damselflies have slender bodies, and hold their wings over the body when at rest (Orr et al. 2004). They are generally found at or near fresh water although some species roam widely and may be found far from their breeding sites (Orr et al. 2004; Corbet 1999). The larvae are

predatory, aquatic and occur in all manner of inland waters (Kalkman et al. 2008; Orr et al. 2004; Corbet 1999).

The Philippine Odonata and its taxonomy are still insufficiently known (Hämäläinen 2004). As described by Hämäläinen (2004), the country has high percentage of endemism in terms of its Odonata Fauna. Luzon, being the largest island in the Philippines has wide ranging lists of interesting Odonata Fauna, some of which are endemic to the island or in a particular region of the island (Villanueva et al. 2012; Gapud 2004; Hämäläinen 2004).

The study of Villanueva and Gil (2011), in the island of Catanduanes provided forty two Odonata species that are a new record of the island and three species are new to science. In 2012, a total of sixty Odonata species were recorded in Isabela and Quezon province and three of which were new to science and four were new island records in Luzon (Villanueva et al. 2012). Odonata recorded in Dumaran island in the northeastern Palawan sub-region also supports the claim that endemism per region or per island is very high in the country. These discoveries denote that there are still more to explore (Villanueva 2011), from virtually unexplored main islands up to the smallest islands in the archipelago. However, the number of critical or nearly endangered species is also significantly increasing (International Union for Conservation of Nature 2011). Species that were previously identified are not actually seen and remain elusive at present time (Villanueva 2011). Human activities and increasing number of population contribute to the deterioration and destruction of habitat, which leads to the increased number of Odonata species that are considered critical or nearly endangered (Hämäläinen 2004).

Odonata became the subject as an ecological indicators (Tiple and Koparde 2015; Henning 2008; Smith et al. 2007), their occurrence in a particular area could indicate good land water condition (Septianella 2014; Henning 2008) since odonates have both aquatic and terrestrial life stages (Bried 2005) and they are also very sensitive to differences in environmental factors such as temperature, oxygen levels, and amount of forest covers (Ramirez 2000). Recent studies also revealed that certain Odonata species demonstrate high association with particular habitats (Gomez-Anaya and Novelo-Gutierrez 2010; Smith et al. 2007).

Despite of the effort in understanding the Odonata Fauna and diversity in the country in general and in Luzon in particular, the Odonata of selected riparian habitats in Bataan/Subic Bay (Luzon) and Mt. Hinunduang/Baroc River Catchment (Mindoro) are still unexplored. Due to continuous forest destruction and other habitat stresses, a faunal survey of Odonata species is urgent. The present study records the Odonata species composition of selected riparian habitats in Bataan/Subic Bay (Luzon) and Mt. Hinunduang/Baroc River Catchment, Oriental Mindoro province. The Collected data will contribute to the information about Odonata in the island and will support the future conservation and management strategies.

Most of the endemic odonate species in the Philippines that are still waiting to be officially described and named are said to be vulnerable to endangerment in the near future due to the loss of their suitable habitats. Primarily, the study focuses on the survey of adult Odonata species in selected riparian habitats in Bataan/Subic Bay (Luzon) and Mt. Hinunduang/Baroc River Catchment (Mindoro) during the months of December 2015 to April 2016. Sites of different altitude and varying vegetation / land use are selected for sampling however, limited to places where government permit are available. The study is limited in determining the diversity, abundances, and richness of Odonata species in Luzon and Mindoro region; identifying adult Odonata species based on their anatomical and morphological characteristics; and classifying them according to species level.

II. METHODOLOGY

2.1 Study Areas

The study was conducted in selected riparian habitats in Bataan (c. 14°64' N, 120°48' E)/Subic Bay (c.14°79' N, 120°23' E) in Luzon and Mt. Hinunduang/Baroc River Catchment, Roxas, Oriental Mindoro (c. 12°35' N, 121°30' E) (see fig. 1). Before the field study was conducted, official consent was obtained from the respective local government units (LGUs), DENR, SENRO, PENRO, and NCIP.

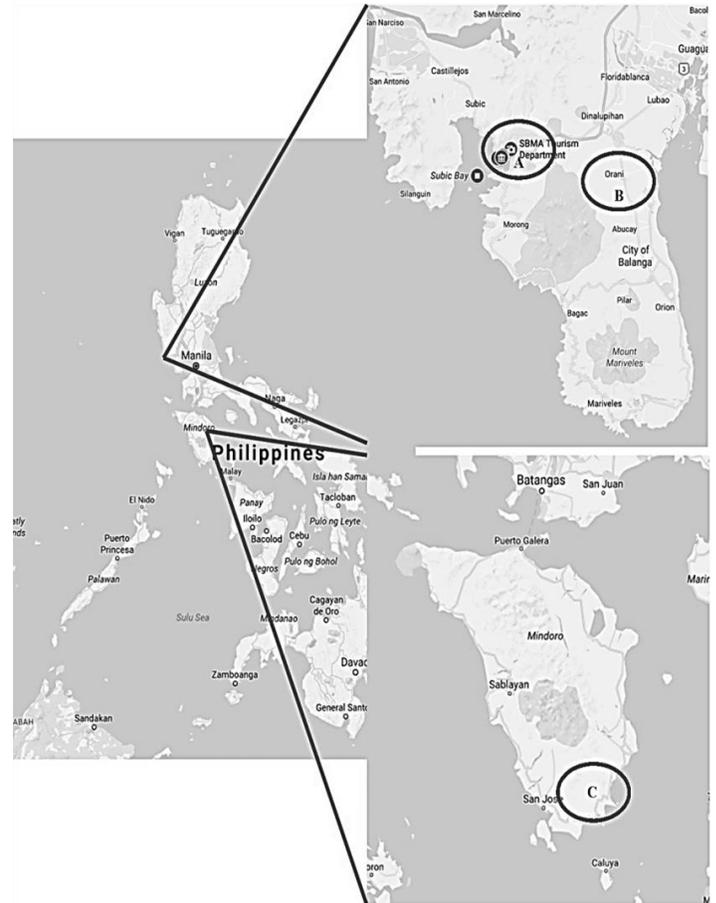


Figure 1. Map of the Three Sampling Sites (A-SBMA, Zambales; B-Bataan; and C-Municipality of Roxas, Oriental Mindoro)

2.2 Sampling Sites

Site 1, Boton River (ca.14°78'67"N 120°29'76"E). This site has an elevation of 110 m asl and is located within the Subic Bay Metropolitan Area. This sampling site is considered as a disturbed primary forest. The Boton Falls is one of the main attractions in Subic Bay wherein travelers from the nearby cities visit the area.

Site 2, Batalan River, Subic Bay (ca.14°43'01"N 120°18'41"E). This area has an elevation of 65 m asl and it is classified as a secondary forest.

Site 3, Orani River (ca. 14°44'15" N 120°24'58" E). The elevation of this site is 460 m asl. The area is located at the foot of Mt. Natib in Bataan. The area is characterized by very steep forested slope.

Site 4, Lower Baroc River (ca.12°35'51"N 121°28'11"E). This area is located in Roxas, Oriental Mindoro and has an elevation of 27 m asl. The sampling area is considered as disturbed farmland. The area is also near the quarrying site.

Site 5, Tagaskan River (ca.12°34'39"N 121°22'24"E), Hinundugan River Tributary at the upper Baroc River

Catchment. The area is located in Brgy. San Vicente, Roxas Oriental Mindoro and it is classified as an extensive farmland with an elevation of approx. 410 m asl.

Site 6, Taugad Daka (ca.12°38'05"N 121°19'33"E), Taugad River Tributary at the upper Baroc River Catchment. The area is located in Brgy. San Vicente, Roxas Oriental Mindoro and it is classified as a disturbed primary forest with an elevation of approx. 530 m asl.

Site 7, Taugad Diit (12°36'39"N 121°20'47"E), Taugad river tributary, upper Taugad Diit River at the upper Baroc River Catchment, this site has an elevation of approx. 525 m asl and is characterized as a secondary forest.

and caught samples for 60-120 minutes, then proceeded to the next sampling site. The samples were collected from eight o'clock in the morning to five o'clock in the afternoon.

Preservation of the specimen was based on the methods used by Mapi-ot, Taotao, Nuneza, and Villanueva (2013). Each captured specimen was placed in an empty white triangular envelope with its wings folded and labeled according to the time, place and day it was collected. Specimens from each site were euthanized using small amount of acetyl acetate. Preservation of the specimen using acetone depended on the respective suborder (24 hours for dragonflies while 12 hours for damselflies). After soaking in acetone, specimens were air dried and placed in tissue paper and stored in a cool and dry place.

2.4 Specimen Identification

Odonate specimens were identified based on their morphological characteristics, such as head, thorax, abdomen, anal appendages, and wing venation. Specimens were examined and measured using OLYMPUS CX21 compound microscope, OLYMPUS SZ40 stereo microscope equipped with digital adapter LW Scientific MiniVid DCM310 and LEICA EZ4 dissecting microscope. Species were identified from family up to species level using published identification keys (van Tol and Gassmann 2007; van Tol, 2005; Gassmann and Hamalainen 2002; Hamalainen and Müller 1997; Hamalainen 1991; Needham and Gyger 1939; Needham and Gyger 1937). Furthermore, the primary researcher also visited the collections of Dr. Reagan Joseph T. Villanueva in Davao City and Dr. Victor L. Gapud in University of the Philippines, Los Baños for comparison, confirmation and verification of the collected specimens.

Photographs of the site and representative species were taken during the sampling by the use of a smartphone. The preserved specimens were photographed by the use of a digital camera.

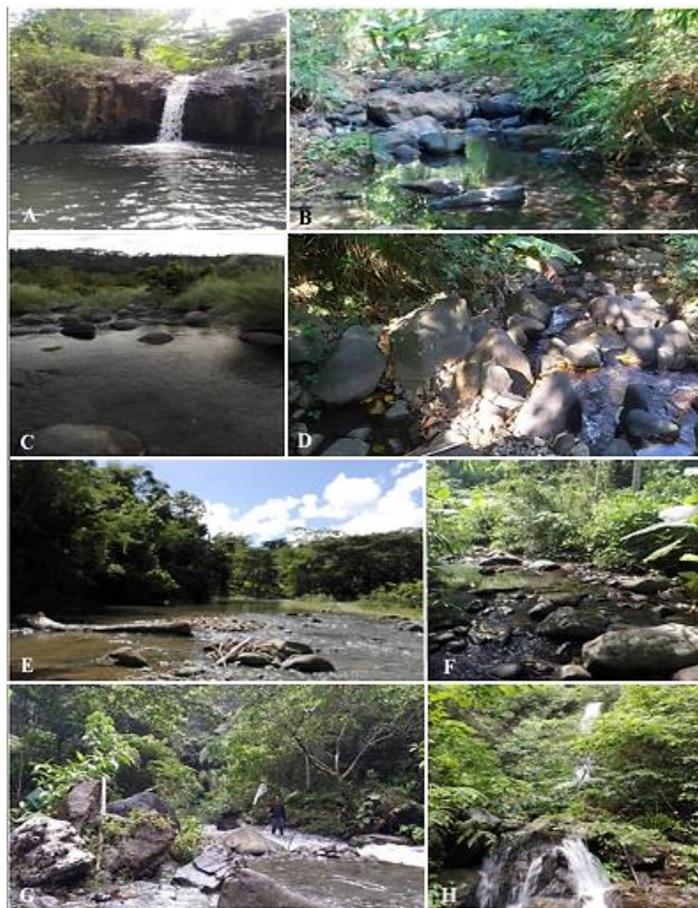


Figure 2. Sampling Sites (A. Boton Falls, B. Boton River, C. Batalan River, Subic Bay, D. Orani River, E-F Tagaskan River, G. Taugad Daka, and H. Taugad Diit)

2.3 Collection and Preservation

The sample collection was conducted twice at all sites during the months of December, 2015 and April, 2016. Opportunistic sampling (Jumawan et al. 2012) was employed to all sampling sites. Odonata were captured through hand picking and by a catching net made from silk cloth with a measurement of 25 x 60 cm. A stretch of 10-15 meters of the river served as the sampling site. Upon arriving at the site, the researcher stayed

III. RESULTS AND DISCUSSION

3.1 Diversity, Abundance, and Richness of Odonata in Luzon and Mindoro

The study surveyed selected riparian habitats in Luzon and Mindoro region during the months of December 2015 to March 2016. A total of 206 specimens belonging to twenty eight species in twenty genera (*Agriocnemis*, *Ischnura*, *Pseudagrion*, *Teinobasis*, *Risicnemis*, *Coeliccia*, *Rhinocypha*, *Cyranos*, *Euphaea*, *Neurobasis*, *Heteronaias*, *Diplacodes*, *Neurothemis*, *Orthetrum*, *Pantala*, *Potamarcha*, *Trithemis*, *Brachydiplax*, *Macrodiplax*, and *Zyxomma*) were recorded and seven endemic species of the family Platycnemididae, Euphaeidae, and Calopterygidae were documented in the study sites (Table 1 and Table 2). Sample species of Anisoptera and Zygoptera collected from this study were found in figures 3 and 4.

Table 1. Species' Abundance and Diversity in the Different Sampling Sites in Luzon

	Luzon Region			Total	%
	Boton River	Batalan River, Subic Bay	Orani River		
Altitude	c.110m asl	c.65m asl	c.460m asl		
Land Cover	Disturbed Primary Forest	Secondary Forest	Steep Forested Slope		
Suborder Zygoptera					
Family Calopterigidae					
<i>Neurobasis luzoniensis</i> ^b	1	1	9	11	18.0
Family Chlorocyphidae					
<i>Cyano unicolor</i>	-	-	4	4	6.6
<i>Rhinocypha colorata</i>	13	3	5	21	34.4
Family Euphaeidae					
<i>Euphaea refulgens</i> ^b	6	-	4	10	16.4
Family Platycnemididae					
<i>Risicnemis pulchra</i> ^a	2	-	2	4	6.6
<i>Risicnemis serrata</i> ^a	-	-	1	1	1.6
<i>Risicnemis sp.</i> ^a	1	-	-	1	1.6
Family Coenagrionidae					
<i>Pseudagrion p. pildorsum</i>	-	-	2	2	3.3
Suborder Anisoptera					
Family Corduliidae					
<i>Heteronias heterodoxa</i>	-	-	2	2	3.3
Family Libellulidae					
<i>Diplacodes trivialis</i>	2	-	-	2	3.3
<i>Pantala flavascence</i>	-	1	-	1	1.6
<i>Trithemis aurora</i>	1	-	-	1	1.6
<i>Zyxomma obtusum</i>	-	-	1	1	1.6
Total Number of Individuals	26	5	30	61	100
Total Number of Species	7	3	9		
Total Number of Endemic Species	4	1	4		

^aEndemic species in Luzon, ^bEndemic species in Luzon and Mindoro

Table 2. Species' Abundance and Diversity in Different Sampling Sites in Mindoro

	Mindoro Region				Total	%
	Lower Barac River	Tagasakan River	Tauga Daka River	Tauga Diit River		
Altitude	c.27m asl	c.410m asl	c.530m asl	c.525m asl		
Land Cover	Disturbed Farmland	Extensive Farmland	Disturbed Primary Forest	Secondary Forest		
Suborder Zygoptera						
Family Calopterigidae						
<i>Neurobasis luzoniensis</i> ^b	-	4	1	18	23	16.1
Family Chlorocyphidae						
<i>Rhinocypha colorata</i>	-	-	4	14	18	12.6
Family Euphaeidae						
<i>Euphaea refulgens</i> ^b	-	-	-	3	3	2.1
Family Platycnemididae						
<i>Coeliccia brachysticta</i> ^a	-	4	-	-	4	2.8
<i>Risicnemis asahina</i> ^a	-	10	4	15	29	20.3
Family Coenagrionidae						
<i>Agriocnemis f. femina</i>	9	3	-	-	12	8.4
<i>Ischnura senegalensis</i>	2	-	-	-	2	1.4
<i>Pseudagrion p. pildorsum</i>	-	8	3	2	13	9.1
Suborder Anisoptera						
Family Libellulidae						
<i>Brachydiplax chalybea</i>	-	2	-	-	2	1.4
<i>Diplacodes trivialis</i>	5	-	-	-	5	3.5
<i>Macrodiplex cara</i>	2	-	-	-	2	1.4
<i>Neurothemis ramburii</i>	-	-	-	1	1	0.70
<i>Neurothemis terminata</i>	-	1	-	2	3	2.1
<i>Orthetrum chrysis</i>	-	1	-	-	1	0.70
<i>Orthetrum pruinosum clelia</i>	-	1	-	-	1	0.70
<i>Orthetrum Sabina</i>	-	-	-	1	1	0.70
<i>Pantala flavascence</i>	-	-	-	2	2	1.4
<i>Potamarcha coengener</i>	-	1	-	-	1	0.70
<i>Trithemis aurora</i>	-	5	3	4	12	8.4
<i>Trithemis festiva</i>	-	6	1	-	7	4.9
<i>Trithemis pallidinervis</i>	-	1	-	-	1	0.70
Total Number of Individuals	18	47	16	62	143	100
Total Number of Species	4	13	6	10		
Total Number of Endemic Species	0	3	2	3		

^aEndemic species in Mindoro, ^bEndemic species in Luzon and Mindoro

Odonata species were collected from Mindoro while there are only thirteen (13) Odonata species collected in Luzon.

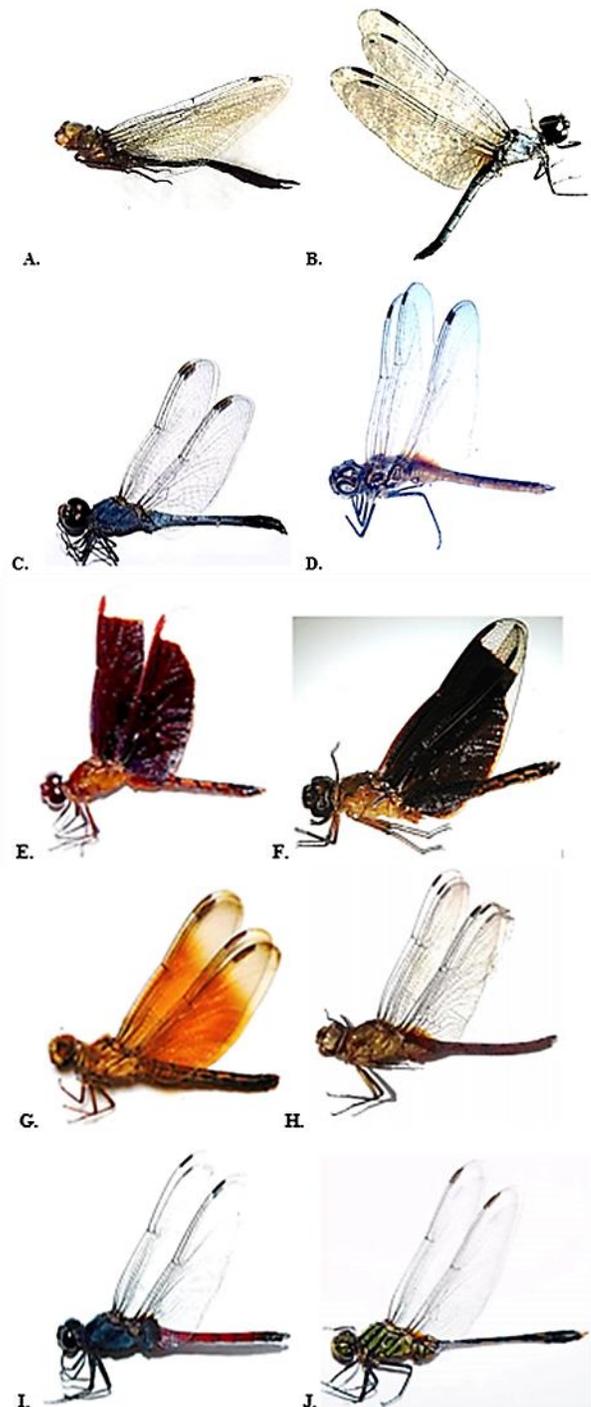


Table 1 and 2 revealed that in terms of the number of individuals per species or abundance, the surveyed areas in Mindoro region is more abundant as compared with the surveyed areas in Luzon region. A total of one hundred forty three (143) individual species were collected from Mindoro, while there are sixty one (61) individual species which were collected in Luzon. In terms of total number of species, a total of twenty one (21)

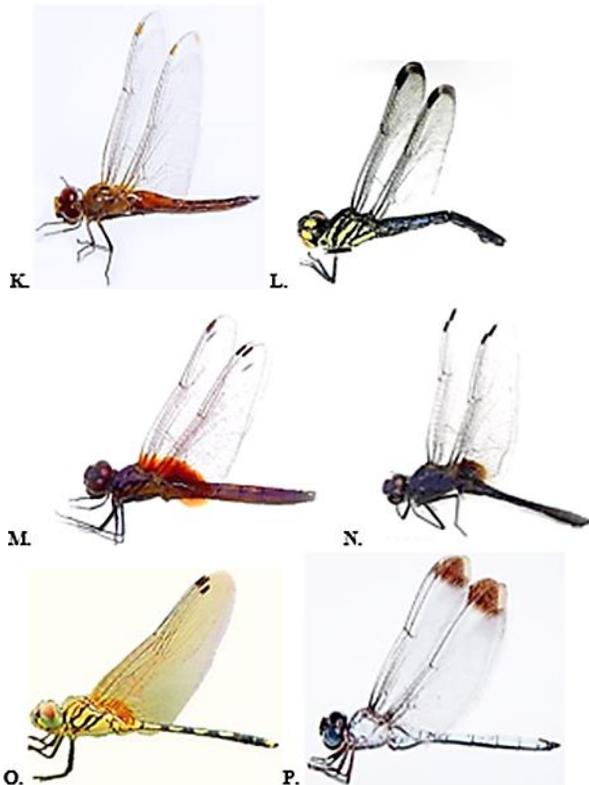


Figure 3. Sample Anisoptera: A. *Heteronaias heterodoxa* (Selys, 1878) (male); B. *Brachydiplax chalybea chalybea* Brauer, 1868 (male); C. *Diplacodes trivialis* (Rambur, 1842) (male); D. *Macrodiplax cora* (Brauer, 1867) (female); E. *Neurothemis ramburi ramburi* (Brauer, 1866) (male); F - G *Neurothemis terminata terminata* Ris, 1911, (F) male and (G) female; H. *Orthetrum chrysis* (Selys, 1891) (male); I. *Orthetrum pruinosum clelia* (Burmeister, 1839) (male); J. *Orthetrum sabina sabina* (Drury, 1770) (male); K. *Pantala flavescens* (Fabricius, 1798) (female); L. *Potamarcha coengener* (Rambur, 1842) (female); M. *Trithemis aurora* (Burmeister, 1839) (male); N. *Trithemis festiva* (Rambur, 1842) (male); O. *Trithemis pallidinervis* (Kirby, 1889) (male); P. *Zyxoma obtusum* Albarda, 1881 (male).

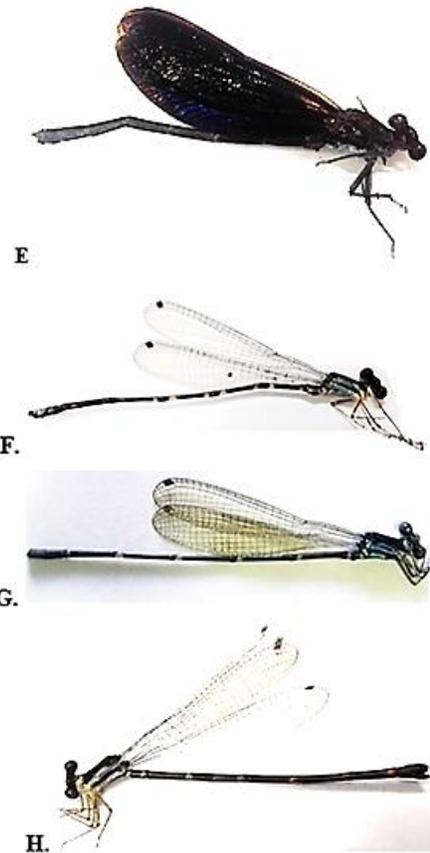


Figure 4. Sample Zygoptera: A -B. *Neurobasis luzoniensis* Selys, 1879 (A) male (B) female; C-D. *Rhinocypha colorata* Hagen in Selys, 1869 (C) male and (D) female; E. *Euphaea refulgens* Hagen in Selys, 1853 (male); F. *Coeliccia brachysticta* Ris, 1912 (male); G. *Risioenemis asahinai* Kitagawa, 1990 (male); H. *Risioenemis pulchra* Hämäläinen, 1991 (female).

Using the data from the tables 1 and 2, the diversity index of the surveyed areas from the two regions were calculated using Shannon-Wiener Index and Simpson's Index. Based from the results, Mindoro region is considered to have a diverse community of Odonata with Shannon-Wiener Index value of 4.96 and Simpson's index value of 8.96 as compared to Luzon region with Shannon-Wiener Index value of 3.95 and Simpson's index value of 5.23. This means that species collected from Mindoro is greater than the number of species collected from Luzon. The results also denotes that the species found in Mindoro are evenly distributed as compared to Luzon. Thus, surveyed areas in Mindoro are diverse than the surveyed areas in Luzon (see Table 3).

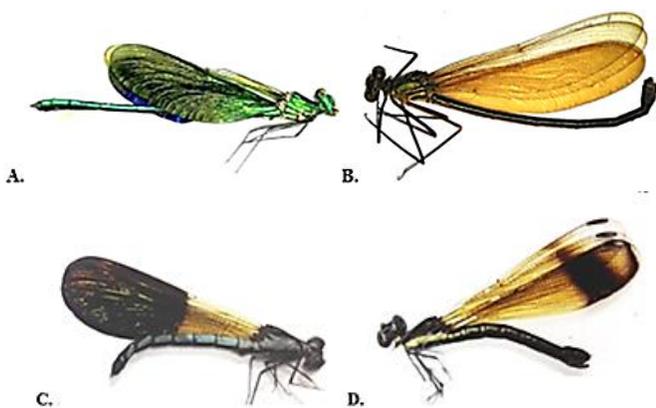


Table 3. Shannon-Wiener Index and Simpson’s Index Values of the Sampling Sites

Sampling Areas	Shannon-Wiener Index (H) value	Simpson’s Index (D) value
Luzon Region	3.95	5.23
Boton River	2.95	3.13
Batalan River	1.90	2.27
Orani River	3.95	5.92
Mindoro Region	4.96	8.96
Lower Baroc River	2.39	2.84
Tagaskan River	3.73	8.03
Tauga Daka River	3.33	4.92
Tauga Diit River	3.40	4.90

Furthermore, Shannon-Wiener index and Simpson’s index values shown in Table 3 which denotes that when it comes to the surveyed areas in Mindoro, Tagaskan River is considered to be the most diverse area among the four sampling sites with Shannon-Wiener index value of 3.73 and Simpson’s index value of 8.03. This denotes that Odonata community in Tagaskan River has a large number of species that are evenly distributed within the area as compared to the other. Furthermore, sampling areas in Luzon is primarily dominated by few number of species, and among the three sampling sites is Orani River which is considered to have a diverse community with Shannon-Wiener index value of 3.95 and Simpson’s index value of 5.92 as compared to Boton River, and Batalan River with the least diverse among the three sampling sites.

The results revealed that majority of Anisoptera are found in the low altitude area, similar results were also found in the study of Medina et al. in 2015, this pattern is attributed to the generally large body size of the species in this suborder, which increases the ability of the organism to move freely or migrate and consequently dispersion and distribution (Van Tol and Gassmann 2007). Furthermore, in larger species, thermoregulation is made possible by solar radiation, and thus they are more frequently found in open areas (Van Tol and Gassmann 2007). Meanwhile, Zygoptera are commonly found in high altitude area, due to smaller body size, thermoregulation seems to be by convection, thereby permitting occupation of shaded places such as forest (Van Tol and Gassmann 2007). Given that most of the sampling areas were mainly surrounded by open areas (pasture) and degraded riparian forest, it is to be expected that species of the suborder Anisoptera are predominant in the two regions.

Libellulidae was the most diverse family and with the highest number of species being collected. This cosmopolitan family is considered to be the largest among other families with 1,012 species identified worldwide and 190 species of this family are oriental. According to Mapi-ot et al. (2013), oriental species are most likely found in disturbed areas (Figure 5).

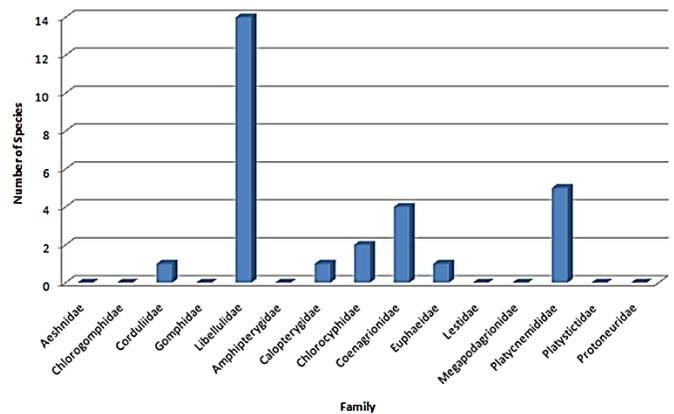


Figure 5. Species records among families occurring in Luzon and Mindoro

High altitude hosts endemic species such as *Risioenemis pulchra* and *Risioenemis asahinai*, this is because endemic species of Odonata prefers forested and apparently undisturbed areas.

There are several species that are expected on the regions but that have not yet been found. *Procordulia moroensis*, *Rhinocypha turconi*, *Vestalis melania* are some of the previously recorded species which were not found during the survey. The absence of several expected and previously recorded species might be accounted for by the weather condition affecting the region during the survey. Further, surveying on the regions is necessary during more favorable weather conditions. This is especially important to locate the “expected” species and find more material of some interesting species. From the collected specimens, one species under the family Platycnemididae is new to science but considered as an additional collection of the specimen and an evaluation is needed.

IV. CONCLUSION AND RECOMMENDATIONS

Tagaskan River and Taugad Diit at the upper Baroc River Catchment in Mindoro Region has the highest number of species collected among all the studied sites, but their fauna consist mainly of a widespread species. Anisoptera are predominant species which found in the two regions because most of the sampling areas were mainly surrounded by an open areas and degraded riparian forest. The Anisoptera are found in the low altitude area, while the Zygoptera are found in the high altitude area.

Both regions are considered to be a diverse areas, although endemism is low. Libellulidae is the most diverse family with the highest number of species collected, while the endemic species such as *Risioenemis pulchra* and *Risioenemis asahinai* are found in higher altitude due to habitat preferences. Furthermore, from the collected specimens, one species under the family Platycnemididae is new to science but it is already an additional collection of the specimen and an evaluation is needed.

Previously recorded species from the respective regions were not found during the survey due to unfavorable weather condition affecting the region during the survey and the increased disturbance (e.g. conversion of forest into agricultural land). Further surveys in these sites are necessary to prove

whether these taxa still occur in the areas and to record further rare taxa that were probably missed out.

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Pulse Oximetry Effectivity For Measuring Oxygen Saturation In Hypovolemic Shock Patient Compared To Blood Gas Analysis At Rsup H. Adam Malik Medan

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Abstract- Background : For patients with critical condition, healthcare professional need to asses actual body oxygenation as soon as possible. Until recently, the gold standard of this measurement is with blood gas analysis (BGA). Pulse oximetry is very useful by it's practicable and portable and been expected represent actual body oxygenation condition especially for non-BGA available centre.

Objective : To measure pulse oximetry's oxygen saturation accuracy for patients in shock condition in comparison to gold standard of BGA.

Method : This is an observational study and had collected cohort prospective data to acknowledge pulse oximetry accuracy for patients in shock condition based on Mean Arterial Pressure (MAP) <65mmHg who admitted to emergency unit.

Result : This study include 39 subjects with mean age 53,36 years old, male composition 53,8% and female 46,2%, dominated by MAP>60mmHg about 46,2%, MAP 56-60 about 25,6%, MAP 50-55 about 17,9% and MAP<50 about 10,3%. The mean result of peripheral oxygen saturation with pulse oximetry is 93,35±6,51%, in comparison to arterial saturation of BGA about 98,21±3,50%. The group of MAP<50 mmHg, 50-55 mmHg, 56-60mmHg and >60mmHg in shock condition patients ascertain that there is no difference between oxygen saturation based on pulse oximetry compared to BGA, by no statistical significance difference which p>0.05.

Conclusion : Peripheral oxygen saturation based on pulse oximetry in patients with shock condition (MAP < 65mmHg) could represent actual arterial oxygen saturation by BGA as the gold standard.

Index Terms- Pulse oximetry, BGA, Oxygen saturation, mean arterial pressure (MAP), emergency, Peripheral oxygen saturation, Arterial oxygen saturation

I. INTRODUCTION

Critical condition need oxygenation measurement as soon as possible. Oxygen partial pressure changing could cause hypoxia and induce vasoactive changing in the brain. In prevention of bad condition to the organ especially brain that could affect the prognosis, routine check of the oxygen saturation is a must. Until now, the mass usual measurement still remain in two, pulse oximetry and blood gas analysis, and the late one, is still the gold standard for this topic.^{1,2}

Hypoxemia condition is hard detected, as ideal condition, clinically not significance until oxygen saturation below 80%. Arterial oxygen is oxygen transfer from lung to cell that brought by haemoglobin molecule in red blood cell. Total amount of oxygen in blood include haemoglobin form bond with oxygen (97-98% of total) and oxygen dissolved in plasma (about 2%). Haemoglobin level with oxygen in artery could measured with oxygen saturation (SaO₂) as the oxy-haemoglobin (HbO₂) compared to haemoglobin total in blood. In intensive care, an inadequate of oxygen to vital organ, put patient in high risk, we must to keep saturation 94% - 96% even with mechanical ventilation. Inaccuracy belief of SPO₂ in critical patient is expected, because it's calibration for the healthy patient and could not applicable for critical patient.³

For shock condition, imbalance of oxygen transport and consumption could cause higher oxygen use. As critical condition, oxygen extraction with increase of oxygen delivery, and the consumption relate to it's delivery. Clinically venous saturation 5% decrease from normal point 70% indicate that significance decrease at oxygen delivery and or increase demand of oxygen. Venous saturation is also important that it's high level could show tissue inability for using oxygen.^{4,6}

Pulse oximetry is very useful because it is practicable and portable and could accompany medical health worker in any condition especially emergency. But for some condition, it is assumed that pulse oximetry could not give representative result

for the actual body oxygenation condition such as shock and low blood pressure. Because it's practical and easy use that could give the best result and benefit for critical condition, we want to acknowledge it's accuracy for that condition we told first such as shock. This study especially discuss about using pulse oximetry for shock patients in emergency room for emergency situation, with mean arterial pressure (MAP) below 65mmHg.^{7,8}

II. METHOD

This study is an descriptive analytic study with a cohort prospective design to acknowledge the accuracy of pulse oximetry in emergency room at Haji Adam Malik Hospital Medan. Total sampling is used to represent population which all subjects who come and meet the selection criteria are included in the study until the number of subjects is met. After obtaining approval from the Ethics Committee, Faculty of Medicine, University of North

Sumatra, based on inclusion and exclusion criteria 39 research samples were collected. All samples were admitted to emergency room with shock criteria, which MAP below 65mmHg. At the same moment, we measured pulse oximetry at the index finger, blood pressure at the other arm, blood sample was taken from femoral artery. For normally test, we used software SPSS 24. Normal if $p > 0.05$, and $p < 0.05$ for not normal, we used one way Annova for normally distributed, and kruskal wallis for not normally distributed. Correlation was considered significant if the p value < 0.05 .

III. RESULT

This study was attended by 39 subjects who met the inclusion criteria. The characteristics of this study were displayed on table 4.1.

Table 4.1 Basic characteristics parameter of subject

Characteristics	N (%)
Age, years	53,26±12,176
Gender, n(%)	
Male	21 (53,8)
Female	18 (46,2)
Consciousness, n(%)	
Alert	3 (7,7)
Verbal	9 (23,1)
Pain	26 (66,7)
Unresponsive	1 (2,6)
Systolic blood pressure, mmHg	81,43±8,47
Diastolic blood pressure, mmHg	46,48±8,03
MAP (<i>Mean arterial pressure</i>)	
<50	4 (10,3)
50-55	7 (17,9)
56-60	10 (25,6)
>60	18 (46,2)
SpO2, %	93,35±6,51
SaO2, %	98,21±3,50
pH	7,32±0,16
PCO2, mmHg	28,11±9,67
PO2, mmHg	148,23±40,06
HCO3, mEq/l	17,83±10,26
BE	-8,71±10,54

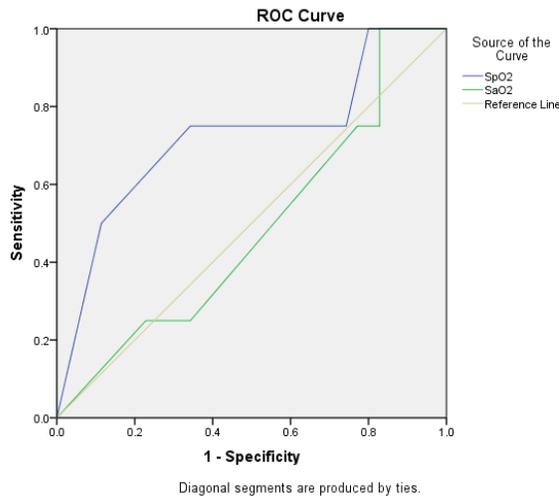
From the analysis, using one way annova and kruskal wallis, we acknowledge that there is no significance difference statistically compared to MAP, for peripheral oxygen saturation by pulse oximetry, arterial oxygen saturation by BGA, pH, PCO2, PO2, HCO3 and Base Excess. The data is showed at table 4.2

Table 4.2 Oxygen saturation difference between pulse oximetry and BGA based on *Mean arterial pressure* (MAP) in shock patient

	<i>Mean Atrial Pressure (MAP)</i>				Nilai p
	<50	50 – 55	56 – 60	>60	
SpO2	98,5 (91-99)	88 (82-99)	93 (68-99)	96,5 (82-99)	0,096
SaO2	99 (97,6-100)	99 (79-100)	99 (93-100)	99 (96-100)	0,871
pH	7,27(7,18-7,34)	7,33(6,9-7,56)	7,33(7,26-7,43)	7,35(7,07-7,67)	0,303
PCO2	25,45±7,09	25,28±8,44	27,04±9,74	30,41±10,66	0,581

PO2	136,5±44,32	141,28±49,79	154,36±44,79	150,14±35,01	0,854
HCO3	12,35 (8,5-12,9)	15,3 (4,3-28,4)	12,35 (9,7-34,5)	18,9 (5,60-50,0)	0,313
BE	-15 (-16-(-12,8))	-9,8- (-26,9-4,6)	-12,8-(-17,9-11)	-8,4-(-20,3-24,6)	0,465

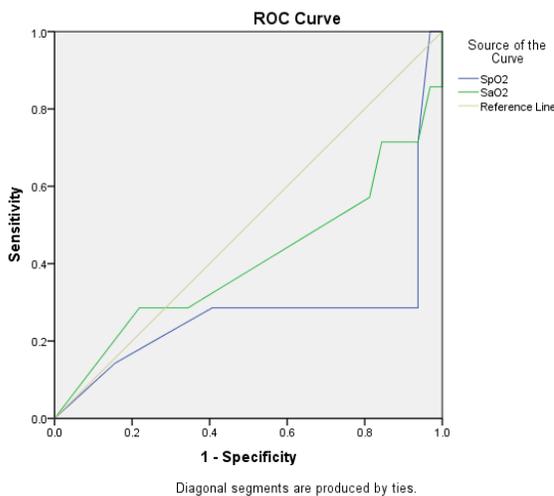
For acknowledge the comparison between SpO2 by pulse oximetry to SaO2 by BGA in measuring oxygen saturation, we used determination test to identify area under curve (AUC) from receiver operating characteristic (ROC) curve, that shown in table 4.3 to 4.6.



50-55 mmHg	
SpO2	SaO2
Sen: 28,6%	Sen: 71,4%
Spes:6,2%	Spes:12,5%
AUC: 0,275	AUC: 0,406
Cut off: 82,5%	Cut off: 97,2%
p value: 0,065	p value: 0,442

Picture 4.1 The Comparison of SpO2 to SaO2 in measuring oxygen saturation for MAP <50

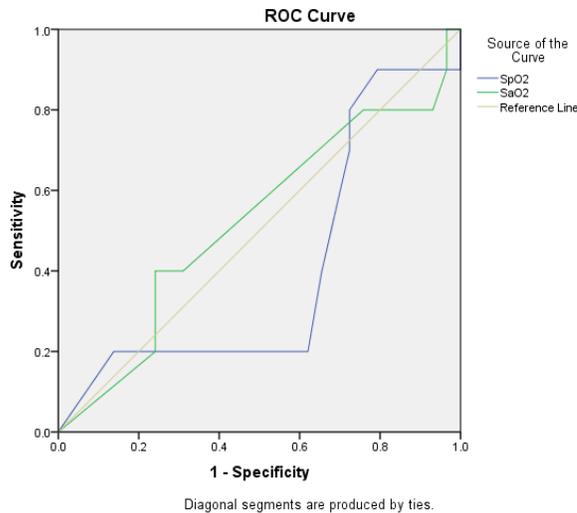
Pulse oximetry could measure oxygen saturation until cut off 96.5% in shock patients with MAP <50 with 75.5% sensitivity and 62.9% specificity with fair relationship (AUC SpO2 0.721) compared to oxygen saturation by BGA in shock patients but there is no significance difference statistically as p>0.05.



MAP < 50 mmHg	
SpO2	SaO2
Sen: 75,5%	Sen: 75,0%
Spes:62,9%	Spes:22,9%
AUC: 0,721	AUC: 0,486
Cut off: 96,5%	Cutoff:98,5%
p value: 0,151	p value: 0,926

Picture 4.2 The Comparison of SpO2 to SaO2 in measuring oxygen saturation for MAP 50-55.

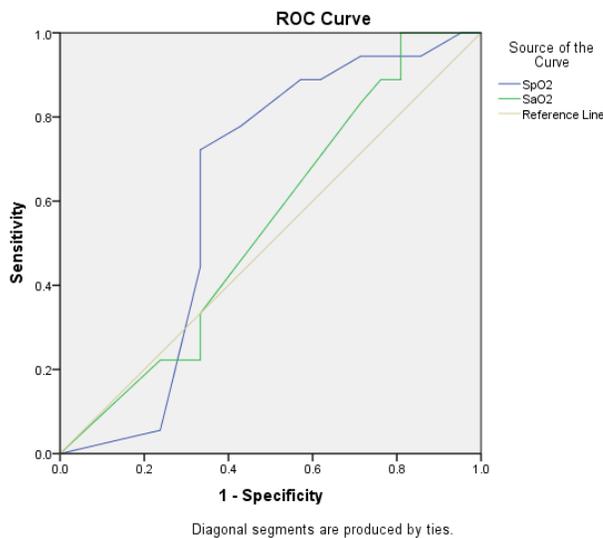
Pulse oximetry could measure oxygen saturation until cut off 82.5% in shock patients with MAP 50-55 with 28.6% sensitivity and 6.1% specificity with no relationship (AUC SpO2 0.275) compared to oxygen saturation by BGA in shock patients but there is no significance difference statistically as p>0.05.



56-60 mmHg	
SpO2	SaO2
Sen: 80%	Sen: 80%
Spes:27,6%	Spes:24,1%
AUC: 0,403	AUC: 0,522
Cut off: 91,5%	Cut off: 98,5%
p value: 0,368	p value: 0,834

Picture 4.3 The Comparison of SpO2 to SaO2 in measuring oxygen saturation for MAP 56-60.

Pulse oximetry could measure oxygen saturation until cut off 98.5% in shock patients with MAP 56-60 with 80% sensitivity and 24.1% specificity with poor relationship (AUC SpO2 0.522) compared to oxygen saturation by BGA in shock patients but there is no significance difference statistically as $p > 0.05$.



>60 mmHg	
SpO2	SaO2
Sen: 88,9%	Sen: 88,9%
Spes:42,9%	Spes:23,8%
AUC: 0,626	AUC: 0,544
Cut off: 92,5%	Cut off: 97,8%
p value:0,181	p value:0,642

Picture 4.4 The Comparison of SpO2 to SaO2 in measuring oxygen saturation for MAP >60.

Pulse oximetry could measure oxygen saturation until cut off 92.5% in shock patients with MAP >60 with 88.9% sensitivity and 42.9% specificity with poor relationship (AUC SpO2 0.626) compared to oxygen saturation by BGA in shock patients but there is no significance difference statistically as $p > 0.05$.

IV. CONCLUSIONS

Based on result and discussion, we conclude that:

1. Pulse oximetry could be used until MAP below 50 mmHg, where the result show no significance difference compared to oxygen saturation by BGA
2. Pulse oximetry could be used as basic for oxygen therapy so decrease mortality risk that caused by late action, in addition, as low as MAP, as much as possible become acidosis

3. Oxygen saturation is still related to microvascular blood flow, noticing also that the measuring could take time more as MAP get lower.

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Career Progression Barriers of Female Staffs in Tanzania

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Abstract: *It is been half a century women's progression in professional career has been in a debate. Yet today, only scant percent of women are able to make their way at leadership and decision making positions at higher education institutions across the globe. However, women career in higher education has been of little concern to researchers. The purpose of this study is to examine the relationship between gender stereotype and social-cultural beliefs with women's career progression barriers among female staffs in a public university in Tanzania. This quantitative approach research has collected data from 300 female staffs of a public university using questionnaire survey. The study analyzes collected data utilizing Pearson correlation and multiple regression model to identify the relationship and test the hypothesis. The findings of the study reveal that gender stereotype, significantly influence the career progression barriers of female staffs. While social-cultural beliefs found to have an insignificant association, thus it does not affect career progression barriers of women staffs. This finding is believed to be logical in the context of Tanzania since it is a very inclusive and liberal nation.*

Keywords: *social-cultural beliefs, gender inequality, women, Tanzania.*

Introduction

Women's progression in the workplace has taken significant strides in the past 50 years (Carr, Gunn, Kaplan, Raj, & Freund, 2015; O'Meara, 2015). In the 1980s, the popular press, including *The Wall Street Journal* and *Adweek*, were among the first who began utilizing the term the glass ceiling, in which reporters noted that, despite 15 years after gender discrimination was made illegal in some places, professional women were remain unable in climbing to senior positions (Hoobler, Lemmon, & Wayne, 2011). Among many other organizations, currently, women in higher education are still underrepresented in senior level administrative positions in college campuses (Jawahar & Hemmasi, 2006). Despite newly developed and suggested mentoring programs, professional development and leadership preparation, women in academia are still not getting along at the same pace as their male counterparts (Catherine Ehrich, 1994, 1995; Stanford-Blair & Dickmann, 2005). Women persist bunched in low-level positions, midlevel administrative positions or positions more outlying to upgrade into central management, such as librarians and student services. The term -glass roof was minted in the early 1980s in reference to artificial barriers to the promotion of women and people of color which prevent them from rising to administrative offices in higher academia (Hymnowitz & Schellhardt, 1986; Oakley, 2000). In a study of female's in low paying work, Harland and Berheide (1994) discovered that adult females deliver a slim to zero likelihood to gain high enough to encounter the glass ceiling; instead, they are trapped by what Harland and Berheide termed the -sticky floor low-pay low-mobility jobs (Harlan & Berheide, 1994). Decision makers are often distinguished by their functional specialization, skills, and preparation (Rosser, 2000). Further distinction happens when groping the administrators' work environment: academic affairs (Jackson, 2004); student affairs (Jackson, 2004) and administrative affairs (Rosser, 2000)

2.0 Literature Review

Traditionally, women have taught preparing meals, caring husband, children and household chores and find happiness in these works. Home is the ultimate place for women to reside and devoting herself completely at the position of homemaker, that is the natural beliefs in many societies. This negative stereotype therefore, viewed career oriented women as irresponsible and morally wrong. However, working women no longer lag behind in most of the profession since today's society has changed drastically in the past few decades. Women employees are performing regular duties as assigned to men. Yet, it is believed that women employees experience glass ceiling as unsurpassable barriers in their career advancement (Ezzedeen, et al. 2015). On the other hand, the enrollment of women at schools, colleges and universities soaring higher than the past decade in many countries. Professional women are now actively participating in the national and world economy since the rate of female labor participation in nearly 50 percent in worldwide (ILO, 2016). However, this scenario doesn't imply the equal opportunities for women in the workplace, especially when it comes to the progression in the senior management level (Tlass & Kauser, 2010). Generally, the

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number of female employees rises at the junior or middle management level in the UK and USA (Lyness, 2002), however, only scant portion progress experienced so far at the senior management level (Metz & Simon, 2010).

Though female workers participate in the national economy, they usually face unequal earning distribution in the workplace. The Organization for Economic Co-operation and Development reported that women earn 16 percent less compared to men in OECD nations and it happens due to one tenth ratio of female board member in corporations (Organization for Economic Co-operation and Development, 2012, Mwandosya & Mbise, 2019). Likewise, the World Economic Forum reported that no country has witnessed yet that achieved gender equality or eradicated gender gap in the shared decision making position (Matonya, 2018; Paton, Bullivant, & Soto, 2020). Thus, it is no doubt that women employees face artificial barriers that limit their career advancement in the senior management level (Myerson & Fletcher, 2000). In this regard, investigating on barriers that restrict women to progress in their career bears great significance in the educational institution, particularly in Tanzania. Higher education has become a necessity in many countries in attaining a higher standard in terms of social and economic development (Kinyaduka, 2019; Matonya, 2018). This is evident in the Tanzanian context as it is strategizing to become a first world economy nation by 2030, where the tertiary education is the foundation for natural development (Kessy, 2020; Nguni, 2020). The plans, which had been incorporated to lead the changes and developments in the Higher education in the country, were done in line with the National Mission. These national blueprints had emphasized on economic and social transformation so that Tanzania could achieve a high-income knowledge-based economy by the year 2030.

Consequently, an empirical investigation of barriers to women's career advancement plays a significant role to underline the reason of female employees' slower and uneven career progress. A diversified group of staff and faculty at top management level is valuable to higher education institutions because it supplies a variety of role models, viewpoints and leadership styles. Thither is a demand for more women in senior level administrative posts in higher education to help close the gender gap (Chliwniak, 1997). Thus, purpose of this study is to quantify the effect of gender stereotype, work-family conflict, social-cultural beliefs, organizational support, and individual characteristics on women's career advancement. The study also aims to identify the research gap in the higher education institution from Tanzanian context so that women's career could be improved through proper initiatives.

The scenario of global workforce shows that female counterpart is more successful in the top level management (Schein, 2007). The author noted that despite 40 percent plus share of women workforce worldwide, their portion of decision making positions remains unacceptably low. Unfortunately, strong believe and mindset about women's inability to hold senior corporate ladders and their lacking to operate any organization with taking the critical decision still available (Nguyen, 2013). Therefore, women employees in many countries are facing various barriers in their professional advancement since men are more likely to be authoritarian to hold those positions, hat certainly includes Tanzania (Dwyer, Kulasingam, Mwimbe, Dickson, & Rogers, 2019; Mushi, 2014). This study aims to examine the factors that put obstacle for women employees to progress in their career. Several studies have believed there are various factors that can act as barriers for women, depending on context, that includes both country and industry where they stay (Jogulu & Wood, 2011; Walsh, 2012). Among others, gender is one of the key factors in career progression (Henkel, 2017; Hernandez and Morales, 1999), thus the hierarchical association between gender types and employers is a critical matter (Rose and Larwood, 1988). Thanacoody et al. (2006) and Nguyen (2013) revealed that gender stereotype creates a barrier for women academics in Australia and Mauritius. Moreover, Wilson (2005) claimed that male still used to look female as having different and inferior qualities in academia. These views of men lead them to hold higher position in academia and women suffer less progression due to gender stereotype (Nguyen, 2013).

Several studies have believed there are various factors that can act as barriers for women, depending on context, that includes both country and industry where they stay (Jogulu & Wood, 2011; Walsh, 2012). Among others, gender is one of the key factors in career progression (Henkel, 2017), thus the hierarchical association between gender types and employers is a critical matter (Rose and Larwood, 1988). Nguyen (2013) revealed that gender stereotype creates a barrier for women academics in Australia and Mauritius. Moreover, Wilson (2005) claimed that male still used to look female as having different and inferior qualities in academia. These views of men lead them to hold higher position in academia and women suffer less progression due to gender stereotype (Eagly & Carli, 2003; Nguyen, 2013).

In addition, social cultural beliefs and perception also shape women decision to work as well influence to take various professional decisions (Coogan, & Chen, 2007; Mccray, Sindelar, Kilgore & Neal, 2002). Ridgeway (2002) claimed that negative perceptions and beliefs that has extracted from the social and cultural background, even from religion are often created obstacle for women to progress. Feugen, Biernat, Haines and Deaux (2004) asserted that the social view toward working women during motherhood is violating the norms of caretaker role, whereas the working father is appreciated in the same context, thus dismiss opportunities for women to excel, but enhance scopes for the counterpart, family duties is another important determinant that can influence women's career progression in the academia (White, 2003). Ismail et al. (2005) asserted that women are often encountered with the difficulty of balancing their work-family obligations in an academic context and many unable to comply, thus witness a slower progression. Though other study argued that multi- tasks can improve an individual's skill and help to

enrich with professional caliber (Ruderman et al., 2002). However, a notable number of researches revealed that the burden of balancing work and family is a major obstacle for women to progress (Jogulu & Wood, 2011; Nguyen, 2013). In addition, social cultural beliefs and perception also shape women decision to work as well influence to take various professional decisions (Coogan, & Chen, 2007; Mccray, Sindelar, Kilgore & Neal, 2002). Ridgeway (2001) claimed that negative perceptions and beliefs that has extracted from the social and cultural background, even from religion are often created obstacle for women to progress. Feugen, Biernat, Haines and Deaux (2004) asserted that the social view toward working women during motherhood is violating the norms of caretaker role, whereas the working father is appreciated in the same context, thus dismiss opportunities for women to excel, but enhance scopes for the counterpart.

The social role theory has identified as an underpinning theory for this study. The theory describes the behavioral differences between men and women (Eagly 1987). According to the theory, differences in behavior happen from gender stereotypes, which are typical roles related to gender (Strodtbeck & Mann 1956). The aim of this study is to examine barriers to women's career progression in a public university. Though this issue has been studied since long, but the appropriate answer to address the issue is still ambiguous and mixed picture is pointed. Therefore, this issue is still alive, especially women in the academic context has been attracting attention since number of current studies have focused on this issue (Henkel, 2017; Parker, Hewitt, Witheriff & Cooper, 2018; Winslow & Davis, 2016). Conversely, this study so far identified only one attempt to address this issue from the Malaysian academic context, however, their study was based on a qualitative survey to understand perceptions (Jogulu & Wood, 2011). Thus, the on-going yet unaddressed issue of women's career progression barriers in the context of Tanzanian public university is justified for further examination.

Gender Stereotype

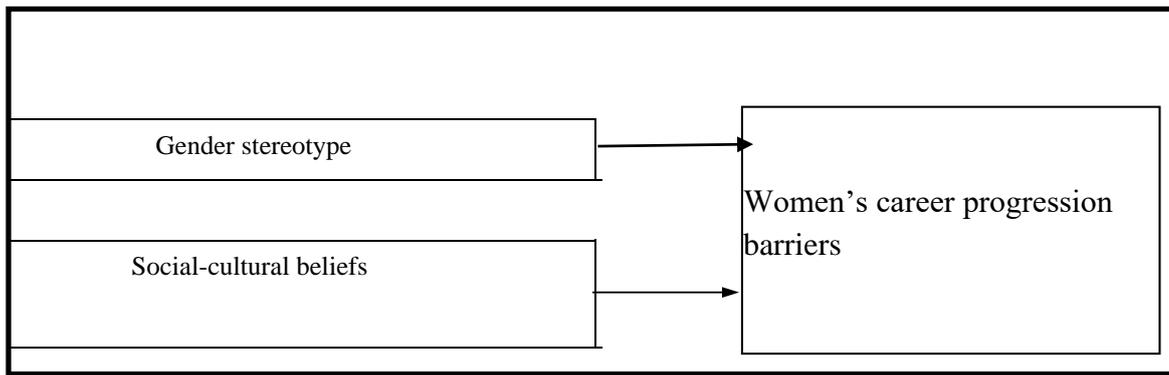
Generally, when people carry generalize thought about the roles and abilities based on gender that represent as gender stereotype. It is shared beliefs about the psychological traits of women and men. Thus, employees in the organization suffer by gender stereotype. Even it is not new that the evaluation of prospective candidate can be biased by gender stereotype in the organization (Heilman, 2001). Therefore, gender stereotype has been repeatedly used in many researches to understand why women lag behind to promote in leading and prestigious position in the organization (Heilman, 2001; Eagly & Karau, 2002). Although women hired in a senior managerial position they usually distinguished as less agentic (achievement-oriented traits) than men (Heilman, 2001; Heilman, Block, & Martell, 1995). Perception driven from the role congruity theory is that female face tough situation to obtain leadership positions than male (Eagly & Karau, 2002). On the other hand, it is speculated that women employees have a lack of personal job fit which block them in acceptances for the senior management role and that is directed by the gender stereotyping perspective (Wood, 2008). For an instant; it has pointed that women employees are the front-liner in the tourism and hospitality industry. However, they are largely presented in clerical and service level jobs, but barely found at professional levels (United Nation World Tourism Organization, 2010), which indicates male are more likely associated with the role of managers in the tourism industry (Wood, 2008). The same story is observed in various other sectors as well.

H₁: Gender stereotype has a significant role in creating barriers on women's career progression

Social-Cultural Beliefs

Social and cultural beliefs represent various aspects of today's society which splits women from their career progression. That includes religious and ethnic identity, ethical behaviour, social policies, relationship status, socialization of female and parenthood (Cooray & Potrafke, 2011; Henning & Pfau- Effinger, 2012). Women unable to prepare themselves to improve skills and take challenges due to socialization practices, hence, females remain lack of corporate educations and experiences which lead them to confined career opportunities (De-Leon, 1996). Moreover, implication of social cultural environment from the perspective of behavioural expectations has found influences women's career advancement and cultural attitudes toward professional female is suggested to quantify in previous research (Jamali & Sdani, 2005). In many societies, cultural attitudes toward the role and status of women are still prevalent and it's quite impossible for many of them to dislocate from this cultural tradition due to fear of being ostracized (Kiamba, 2008). Likewise, working outside the home in many societies considered as the violation of cultural norms and traditions (Majanja & Kiplang'at, 2003; Wood, 2008). Therefore, women's professional progression prospects are still considerably illiberal. In addition, traditional beliefs imply that men are the chief of the household, the breadwinner and possess the right of social life, whereas, women's role is caring household despite involving education and professional life (Sadie, 2005). As a result, cultural attitudes and beliefs toward women's progression in decision making position are adverse (Sadie, 2005).

H₂: Social-cultural beliefs have a significant role in creating barriers on women's career progression.



Source: Adapted (Cross, 2010). Figure .1 *Research Framework*

Women's Career Progression Barriers

The dependent variable of this study is women's career progression barriers. Swanson and Woitke (1997) referred -barriers in this context as conditions or events, either internally alleged or seen in a woman's atmosphere, which hinder career progress. Examples of such barriers include conflict between career demands and child caring, multiple tasks struggle, inadequate career prospects, limitation in adequacy of childcare, gender discrimination, and career self-efficacy. Another study defines, barrier to career progression as a factor, event or phenomenon that prevent or control access to individual women from making progress (Ismail & Ibrahim, 2008).

Gender Stereotype

Gender stereotyping is the practice of ascribing to an individual woman or man specific attributes, characteristics or roles on the sole basis of her or his membership of the social group of women or men. According to the United Nation Human Rights Office of the High Commissioner. A gender stereotype is a generalized view or preconception about attributes or characteristics that are or ought to be possessed by, or the roles that are or should be performed by women and men. Stereotypes are generalizations about groups that apply to group members simply because they belong to that group. Gender stereotypes are generalizations about the attributes of men and women (Heilman, 2015)

Social-Cultural Beliefs

It refers to a set of beliefs, customs, practices and behavior that exists within a population. The social-cultural perspective is a theory used in fields such as psychology and is used to describe the awareness of the circumstances surrounding individuals and how their behaviors are affected specifically by their surroundings, social and cultural factors. According to scholar sociocultural perspective: A perspective, describing people's behavior and mental processes as shaped in part by their social and/or cultural contact, including race, gender, and nationality (Ouellette & Wood, 1998). Social-cultural beliefs which are made up of collection of activities and relationships through which people engage in their personal and private lives which include population features, age, ethnicity, religion, values, attitude, lifestyles and associates (Shumbusho, Henry, & Sharon, 2020).

3.0 Research and Methods

The data obtained from the questionnaire survey are analyzed using Statistical Package for the Social Sciences (SPSS) version 23 to analyze the validity and reliability of the data and test the research hypotheses. All the incomplete questionnaires and data will be dropped from the data analysis to ensure the final data collection is worthy to enter into SPSS software for analysis. The analysis begins with descriptive statistics to present the data acquired in a structured, accurate and summarized manner. The descriptive analysis, which includes frequencies and percentages is used to analyze the demographic data. The demographic data, including job title, job level, age, marital status, education, ethnicity, husband, job sector and children status of the respondents. Similarly, the descriptive analysis also checked the frequencies of all independent and dependent variables included mean, standard deviation, maximum and minimum values. In addition, the five facets of barriers to women's career progression were measured for the reliability to check for the consistency and Cronbach's alpha coefficient was used to determine the consistency. The closer Cronbach's alpha value to 1, the higher the internal consistency reliability (Sekaran, 2003). The correlation between the independent variables and a dependent variable was determined through analysis, namely Pearson correlation two-tailed test.

4.0 Findings Correlation Analysis

According to Pallant (2011), correlation test is utilized to explain the strength and direction of the linear association between selected variables. Sekaran & Bougie, 2009 asserted that Pearson correlation coefficient refers the direction, strength and significance of the bivariate relationship among the study. The Pearson correlation is denoted by letter *r* and the value, ranging from -1 to +1. Pallant (2011) suggested that the strength is determined as: $r = 0.50$ to 1.0 is strong, $r = 0.30$ to 0.49 is moderate or medium and $r = 0.10$ to 0.29 is correlation for statistical significance.

Table 1
Pearson Correlation Analysis

Variables	WCP	GS	SCB
WCP	1		
GS	.597**	1	
SCB	.515**	.604**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Note: WCP= Women career progression, GS= Gender stereotype, SCB= Social cultural beliefs.

Table 1 presents the outputs of correlation test between all independent variables with dependent variables. All independent variables show a positive correlation with the dependent variable. The highest correlation is reported between gender stereotypes and barriers to women’s career progression at $r = .597$ ($p < 0.000$) and $r = .515$ ($p < 0.000$) social-cultural beliefs. Overall, independent variables have shown a strong correlation with the dependent variable, therefore, these can be further analyzed for hypothesis testing.

The multiple correlation co-efficient (R) between the dependent variable and the independent variables is 0.688. Moreover, the coefficient of determination, R^2 is reported .473 which indicates that 47.3 percent of the variance in women’s career progression barriers has explained by these two independent variables analyzed in this research. The rest of the percentage (52.7%) is explaining other factors that are left out of this study. The regression model is significant, with a probability level of 0.000 as evidenced in the ANOVA table.

Table 2
Results of Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.531	.225		2.361	.019
GS	.338***	.064	.320	5.246	.000
SCB	.065	.060	.070	1.087	.278
R	R^2		Durbin-Watson	F-statistics	
.688	.473	.463	1.424	46.292 ($P < 0.000$)	

Statistically significant at * 10%; ** 5% and *** 1%.

Notes:

- a. Predictors: (Constant), social cultural beliefs and gender stereotype.
- b. Dependent Variable: Barriers to women’s career progression.

This study hypothesized that gender stereotype has a significant relationship in creating barriers for women to progress. The regression results show evidence as hypothesized. Gender stereotype has a significant positive relationship with barriers to women’s career progression where the coefficient is .320 and $p < 0.000$. This study reveals that, there is an increase of 0.320 in gender stereotype for every unit increase in the barriers to women’s career progression. Therefore, hypothesis 1 is accepted.

This study hypothesized that social-cultural beliefs has a significant relationship in creating barriers for women to progress. The regression results show reverse evidence than the study predicted. Social-cultural beliefs found to have an insignificant positive relationship with barriers to women’s career progression where the coefficient is .070 and $p > 0.05$. This study indicates that, there

is no effect on social-cultural beliefs for any changes in the barriers to women's career progression. Therefore, hypothesis 2 is rejected.

5.0 Recommendations

Despite an insignificant evidence of socio-cultural beliefs, this study also identifies several strong associations between other independent variables and a dependent variable. Therefore, to resolve or minimize the issue for university staffs, this study places the following recommendation based on the findings. University management should promote fair and comfortable work environment for both male and female staffs. Management should provide opportunities for female staff to demonstrate their credibility that will not only increase their confidence, but will also reinforce to break the stereotype against women. The researcher has observed that women in Tanzania generally soft spoken, shy, easy going and prefer to stay in a comfort zone. Therefore, there will be two folds of initiatives. First, female staff has to be confident and outspoken, and should increase their self-esteem to take any professional challenge. Secondly, university management should engage female staff with more public activities, especially providing them to organize public events which will allow them to mingle with various types of people.

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Liquidity Risk in Conventional and Islamic Banks Literature Review

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Abstract: *Following the 2008 Global Financial Crisis and 2014 oil price fall liquidity risk in banks is a major issue. The main objective of this journal article is to examine liquidity risk of Conventional and Islamic Banks. The study uses data of banks operating in banking regulatory environments. The implications of the results will be bank management, government and regulatory bodies of banks to manage the significant factors influencing liquidity risk effectively because they have direct impact on the banks' cost efficiency and profitability. It is therefore recommended that the practitioners and policy makers to examine closely contract that should be backed by long term capital to mitigate liquidity risk. This will ensure greater profitability of commercial banks in the dual banking environment.*

Keywords: Liquidity Risk, Banks

Introduction

Banking institution plays a crucial financial intermediation role in the economic system of any country. Thus, banks have responsibility of providing fundamental services that include, but not limited to, acceptance and collection, as well as safe keeping of customers' funds, which the banks usually transferred or exchanged for financial or economic benefits of the customers on their instruction (Askari, Iqbal, Krichene & Mirakhor, 2012). The bank's services facilitate economic activities as well as promote greater efficiency being intermediaries in meeting the investment and liquidity needs of the economic agents in the financial system Athukorala and Warr (2002), submit that higher risk is associated with higher return but it can also lead to higher risk of failure. The history of bank failure is attributable to excessive risk taking by banks. This calls for regulatory bodies to control risk behaviors of banks. However, self-governance is vitally important in risk governance and internal control. Every bank whether conventional or Islamic is facing liquidity risk. According to financial intermediation theory, financial institutions exist because of its role in real economy to create return to shareholders by taking calculated risk (Campbell & Kracaw, 1980; Diamond, 1984; Allen & Santomero, 1997). Risk management thus forms one of the activities of banks. There must be a risk management program with risk management framework made available.

Literature Review

Liquidity risk is one of the foremost risks faced by public banks. It is the heart of a financial institution's operations. When banks face liquidity problem, they cannot perform the intermediation role effectively. It is apparent from the GCF 2008 experience that liquidity risk poses major issues on the survival, profitability and efficiency of banks especially in less developed countries, whose member states are mostly poor (COMEC, 2015). Moreover, the global growth of banks can only be sustained with a robust risk management practice. However, this is not yet effective even in countries with more years of experience as managing risks such as credit risk and liquidity risk poses continuous challenges to banks. The critical issue on liquidity management in banks arises because of the banks' orientation towards short-term borrowing as against long-term financing (Ismael, 2010). This represents a liquidity gap or a funding mismatch manages liquidity problems.

Besides these instruments, the conventional banks also have access to central banks as lender of last resort in case of emergency. The central banks provide liquidity support to conventional banks again on interest basis which is not acceptable to Islamic banks. The absence of this support from central banks to Islamic banks is another factor militating against adequate liquidity position of many of the Islamic banks. This poses operational problems to manage their liquidity. For instance, Ali (2007) reports that one of the factors that led to the collapse of one of the Islamic banks in Turkey, Ihsan Finans was that deposits of the bank were not protected by the central bank's insurance system. However, Islamic banks' deposits in Malaysia are protected by Malaysian Deposit Insurance Corporation (MDIC). MDIC is to promote confidence in the banking system and to avert runs on individual banking institutions especially during crisis (Sabri, 2013). Nonetheless, there is need to be more careful in raising funds as well as prudent in investing them to safeguard the liquidity of the banks. A major gap on liquidity research is that there is inconsistency in the determinants of liquidity risk. This has resulted in different researchers giving conflicting views on the significance of various factors that influence liquidity risk. For instance, on bank specific variables, while Muharam and Kurna (2013), and Mehmed (2014) suggest a negative and significant relationship between Return on Equity (ROE) and liquidity risk, Siaw (2013) and Anam, Hassan, Huda, Uddin and Hossain (2012) reports a positive correlation between the two variables.

Similarly, bank size measured in terms of total assets produced more contradictory results. For Siaw (2013), Sabri (2014), Ramzan and Zafar (2014), it is a positive correlation between bank size and liquidity risk while Sulaiman et al (2013) reveals a negative association between the variables. Yet, Ahmed, Ahmed and Naqvi (2011) report that variable size and profitability are not powerful explanatory variables to define the liquidity risk of Islamic banks in Pakistan. Again, these differences challenge the theory of 'too big to fail' (TBTF) (Kaufman, 2013) which suggests a negative connection between bank's size and liquidity risk. Hence, the inconsistencies in the result of return on assets (ROA), total assets and capital adequacy on liquidity is a research gap which warrants further investigation to confirm the results. Another major issue of banks on liquidity management is asset and liability mismatch. Liability items represent sources of fund like deposits, while assets indicate the utilization and uses of such funds as financing. Based on their annual reports, banks tend to have short term liabilities to finance long term assets (Greuning & Iqbal, 2008). This is maturity mismatch which means borrowing short to lend long (Bourakba, 2015). The theoretical business model for banks as a special type of intermediary is that maturities of assets and liabilities should be matched. This is due to asset-backed principle which ties financing to the various activities of the real economy. However, due to domination of fixed income financing, there is always a mismatch between assets and liabilities which result in liquidity issues. The effects of macro-economic variables in terms of Gross Domestic Products (GDP) and inflation effects on liquidity risk is also not settled. Mehmed (2014) reports that the choice of dependent variable determines which factors influence liquidity risk in the banking sector. Using liquid assets to customer deposits and short term funding as a measure of liquidity risk shows higher explanatory power than using liquid assets to total assets. Sabri (2014) observes an insignificant positive association and Vodova (2013) asserts an uncertain relationship between GDP and liquidity risk. Almost all studies used GDP to measure economic performance and the results were not conclusive. GDP is an aggregate that only measures flows but not stock of wealth of an economy. It also excludes many household activities that are productive in an economic sense (Stiglitz, Sen, & Fitoussi, 2009).

Additionally, the focus on liquidity risk was not pronounced until after the 2008 global financial crisis. Previously, credit risk has been the priority of banking industry. Now, attention is on liquidity risk as against managing interest rates and credit risk due to drying up of liquidity at the time of crisis (Peeble & Shah, 2015). This increasing concern explains why liquidity is featured prominently in Basel III following the financial crisis. Inadequate research on commercial banks in LDs regarding liquidity risk is another concern addressed in this study. Also, related to this is the impact of type of regulation governing the banks on the liquidity of banks. This refers to dual banking or wholly Islamic banking regulated systems. Klomp and Haan (2012) find regulation has significant impact on high-risk taking banks. However, it does not have significant effect on low-risk taking banks. The authors used factor analysis to measure both multi-faceted concepts of banking risk and banking regulation. On the other hand, Sabri (2014) shows that liquidity risk is significantly determined by stringent officially supervisory power on capital regulation and banking activity restrictions. Although regulations have been studied in those past researches, but it is not in the context of liquidity risk. What is also lacking is that many specialized standard-setting bodies have developed specific standards, but these regulatory frameworks do not provide for the risks that are unique to Islamic banks in many countries (Kammer, et al. 2015). Consequently, the way Commercial banking is being practiced in some countries has brought about intricate financial transactions. Operations across borders have also been stretched without proper regulatory coordination. It is postulated that the findings could lead to increased regulatory clarity and synchronization, and further improvement of regulatory tools for effective supervision.

Risk Management in Banks

The business of banking whether conventional is to take calculated risk. Banks are economic entities that specialize in risk management and maturity transformation (Howladar, 2011). Risk management is more of optimization risk reward equation rather than minimization of losses. Thus, a bank will be in a competitive advantage if it can manage its risk (Jeroen, 2015). Risk management as a subject and professional discipline is gaining momentum (Ebrahim, 2011). It is now seen as distinct from corporate governance, Internal Audit or Control, Financial reporting and regulatory compliance to which it is closely linked. Risk management is a process that involves identifying, measuring, mitigating, reporting and monitoring risk (Ismal, 2010; Jeroen, 2015). It is a management process that deals with uncertainties an entity faces, threats to its resources and its consequences. It provides opportunities to increase the value of the entity based on its operating environment (Ebrahim, 2011). It is also seen as being concerned with both positive and negative aspects of risk. The practices of risk management, processes and tools which measure the risks and the techniques adopted to mitigate risk are similar in both Islamic and conventional banks (Al Ali & Naysary, 2014). In most cases, where Islamic banks are relatively new, the central banks apply the same rules to both Islamic and conventional banks.

Liquidity in Financial Institutions

The word liquidity has so many facets that is often counter-productive to use it without further and closer definition (Banque De France, 2008). It is a concept that is not only hard to define but also hard to ignore (Calvo, 2013b). Liquidity relates to the ability of an economic agent to exchange his or her existing wealth for goods and services or for other assets. Here, liquidity is regarded as a flow concept rather than stock (Nikolaou 2009). Thus, an asset is said to be liquid if it can be easily converted to cash or its equivalent (Ali, 2013). Similarly, Bankscope defines liquid assets as loans with less than three months to run to maturity plus quoted or listed government bonds and cash (Alman & Oehler, 2010). Furthermore, liquidity is the lifeblood of any organization (Sekoni, 2015). This means that both banking and non-banking institutions require liquidity and management of cash and liquid assets is a fundamental management function in any organization.

In economics, liquidity refers to the ease and speed at which one asset can be converted into another (Sanghani, 2014; Vasigh, Fleming &, Kenneth, 2014). Based on this definition, a car for instance is less liquid an asset than gold, and treasury bills are more liquid than corporate bonds. Thus, money (cash) is the most liquid of wealth (Hasan, 2014). There is always a tradeoff between profit (from lending or investment) and liquidity in bank's business. This is because while banks deal in cash or liquidity, they operate on a fractional reserve principle. The regulatory principle is to maintain balance between liquidity and profit. The structure of a bank's balance sheet depicts the importance of liquidity. On the asset side, the listing is from the most liquid asset (cash) to the most illiquid one (fixed assets like building). This is contrary to the reverse listing in other organizations where the fixed assets are first listed (Hasan, 2014). Moreover, the survival of a banking institution and the entire financial sector depends on the ability to provide liquidity and also understand the proper way to mitigate its risk. The main objectives of liquidity are to guarantee that banks are able to meet up with cash obligations without compromising their profitability. In addition, liquidity is inherent in every market and it manifests itself in every transaction involving assets or portfolios trading. Sekoni (2015) also reports three situations in which liquidity manifests itself. These include the need for daily business transactions, investment activities and in case of fire-sales when there is shortage of reserves. Shortage of liquidity always occur when there is financial crunch. During such crisis, there is often massive outflows of capital with no more or at least equal inflows.

Sources of Liquidity for Banks

Nikolaou (2009) enumerates four sources of liquidity. The first is short-term (liquid) deposit. This is money entrusted by depositors to the bank. It is considered as the major source of funding liquidity. The second is the market liquidity. This is when the banks engage in selling of assets in markets to generate liquidity. This can be through loan syndication, securitization and loans from secondary markets. The third liquidity is referred to as interbank market. Here, liquidity can be sourced by banks from other banks through interbank market. The last source is the central bank. Through its function as lender of last resort, central banks do directly provide liquidity to banks. The Central Banks act as an immediate but temporal buffer to liquidity shocks which allows time for supervision and regulation to confront the causes of liquidity risk (Nikolaou, 2009). Nikolaou (2009) also identifies monetary or macroeconomic liquidity which he refers to as the growth of money, credit and aggregate savings. Thus, it includes Central bank liquidity which he says is synonymous to supply of base money. In addition, there is also funding liquidity which is the ability of banks to meet their liabilities and to settle their obligations as they come due (BIS, 2008). There are linkages among these sources of liquidity. In normal periods, the Central banks make available the amount of liquidity that will stabilize demand and supply through controlling of Statutory Reserve Requirement (SRR), while market liquidity is managed through the interbank money market and short term asset markets re-distributes and maintain the liquidity and funding position. Liquidity management also safeguards an effective sharing of liquidity resources. However, in an atmosphere of imperfect markets, and irregular information, the Central bank cannot differentiate between illiquid bank and the bank in debt. When there is a failure in coordination among depositors, banks, or traders which provide and are provided with information asymmetric and imperfect markets, the liquidity risk will result (Nikolaou, 2009).

Liquidity and Solvency

Liquidity and solvency are closely interrelated (Goodhart, 2008). These two terms refer to the financial wellbeing of an organization. However, there is difference. Solvency denotes the extent to which long-term obligations of an organization can be met. Liquidity on the other hand refers to the capability to settle short-term obligations. A solvent firm owns more than it owes. An illiquid bank can rapidly become insolvent, and an insolvent bank become illiquid. Davydenko (2013) defines solvency in terms of market value of assets relative to the debt of an organization while liquidity is cash reserves relative to current liabilities. Banks fail because of insolvency. A combined shortage of liquidity can also render a bank insolvent. Banks' failure also cause liquidity and can lead to shrinkage in the collective pool of liquidity (Diamond & Rajan, 2002). Liquidity and solvency problems interact and one can cause the other. The issue here is; illiquid assets are usually financed by banks with demandable claims. A company is solvent if its assets are more than its debt. This means that its net worth is positive and able to manage its debt portfolio (Pappas, et al. 2013). It also means that when a company is solvent, it has more assets than liabilities. The company can settle its debt without losing its net worth.

Solvency risk occurs when a bank is not able to meet up maturing obligations due to its being in a negative net worth (Almarzoqi, Naceur, & Scopelliti, 2015). This means the bank has more liabilities than assets. This usually happens when a bank suffers losses on assets due to write-offs on securities and unsettled loans but the capital base is not sufficient to cover the losses. Two factors that influence solvency position are adequate capital and profitability. Liquidity risk on the other hand happens when a bank is not capable of meeting short-term obligations. This occurs when the bank does not have enough funding (funding liquidity) or if its investments and assets cannot be sold quickly for cash without incurring unnecessary losses (market liquidity) (Almarzoqi, et al. 2015). Thus, liquidity ratios and solvency ratios are apparatuses investors use to make investment decisions. Liquidity ratios measure a company ability to change its assets to cash, while solvency ratios measure a company's ability to meet its financial obligations. Solvency ratios include financial obligations in both the long run and short term, whereas liquidity ratios focus more on a company's short-term debt obligations and current assets.

Liquidity during Global Financial Crisis

Peeble & Shah (2015) reports that these days, investors are spending a great deal of time on worrying about liquidity risk as against managing interest rates and credit risk. According to the authors, the reason is that liquidity is drying up at the time of financial crisis due to subprime borrowers' inability to pay the banks their mortgages. Similarly, Bank for International Settlement (BIS) also states that liquidity in recent years has become a key focus of international policy debates. This reflects the view that global liquidity and its drivers are of major importance for international financial stability. According to the report, in a world of high capital mobility, global liquidity issue should be approached in a different way. Furthermore, Calvo (2013a) asserts that liquidity and credit shocks have been a central factor in recent crises. He says liquidity consideration explains why a credit boom always precede financial crisis and why capital inflows grow in the run-up of balance-of-payments crises. In support of this argument, Asongu (2013) reveals that liquidity risk management has become increasingly vital in the banking industry especially following the recent financial melt-down and economic down-turn. The author posits that during the crisis, increasing credit concern and feeble market liquidity resulted in a cycle of deteriorating asset market value and deleveraging. The implication of this is that there is more focus on liquidity following the global financial crisis and that the concept of liquidity lies at the heart of commercial banks and the management of its funds. It represents one of the crucial risks in banking industry (Muharam & Kurna 2013).

Liquidity Risk in Banks

Liquidity risk is complex to define. However, its causes and symptoms can be identified more easily (Sekoni, 2015). He defines liquidity in terms of capital and earnings of an organization not meeting its financial obligations without suffering undesirable losses. There are several definitions of liquidity risk. It arises when an asset cannot be disposed without suffering additional losses (Ali, 2013). The study also defines it in terms of likelihood of illiquid positions. Thus, according to him, liquidity is inversely related to liquidity risk. This means when liquidity risk is high, there is tendency for illiquidity. Similarly, Hasan (2014) defines liquidity as the possibility of loss due to a temporary inability to meet an obligation because of shortage of cash.

Causes and Sources of Liquidity Risk

Kumar (2008), identifies the following causes of liquidity risk to include sudden or unexpected large deposit withdrawals and credit disbursement. It also includes a situation when contingent obligations become due unexpectedly. According to the study, other events that cause counterparties to avoid trading or lending to the bank can also result into liquidity risk. Also, when the sectors which the banks depend on suffer loss of liquidity, this can lead to liquidity risk of the bank itself. In addition, Mohammad and Shahwan (2013) also explain that limited accessibility of Shari'ah-compliant money and inter-bank markets are major sources of liquidity risk of Islamic banks. The financial instruments are not adequately developed to allow Islamic banks raise funds when required. The available financial instruments in conventional banks are interest based. The rule that available Islamic products like *Murabahah* and *Bay' al-Salam* can only be traded at par value is also responsible for lack of liquidity in Islamic banks. Another significant cause of liquidity risk identified by Mohammad and Shahwan (2013) is the conflicting interpretations of Shari'ah teachings on some of the Islamic products. For instance, while *bay'al-dayn* (sale of debt) is acceptable in Tanzania, it is not allowed in other regions. Furthermore, public banks in Tanzania are smaller in number in most of the countries and they depend mostly on demand deposits which can be withdrawn at any time. This again pose liquidity risk to the banks. Thus, if liquidity risk is not maintained properly, there is a threat to banks of becoming insolvent or subjected to bad publicity and reputational damage. Liquidity risk has compound effect on other risks, hence it is more important to manage it effectively.

Many studies have been conducted on the determinants of liquidity risk in banks. For instance, Sulaiman, et al. (2013) report that macroeconomic variables influence the behavior of Islamic banks in managing liquidity risk. According to the authors, variable Gross Domestic Product (GDP) are significant and directly proportional to liquidity. In addition, there are also bank specific factors influencing risk management. For instance, Ahmed, et al. (2011) while using liquidity risk as a dependent variable assert that leverages, tangibility and age are important determinants of liquidity risk in Islamic banks. The authors claim that variable size and profitability are not powerful explanatory variables to define the liquidity risk of Islamic banks in Pakistan. On the other hand, Htay, Adnan, AiRashid, and Meera (2011) examine the impact of corporate governance on the risk of banks and conclude that separate board leadership structure, higher proportion of independent directors, smaller board size, lower director ownership, higher institutional and block ownership seem to have lower impact on risk in Islamic banks.

Similarly, Muharam and Kurna (2013) investigate the influence of capital adequacy ratio (CAR), profitability ratios, return on assets (ROA), return on equity (ROE), Net Interest Margin (NIM), liquidity gaps (LG) and risky liquidity assets (RLA) on liquidity risk in banking industry. The authors point out that there is a negative and significant influence of CAR and ROE on conventional banks, while ROA and RLA have positive and insignificant effect. They also submit that while NIM, ROA and ROE have positive and significant effect on liquidity risk in Islamic banks, the LG and RLA have insignificant effect. Furthermore, they reveal that LG have positive and significant effect in conventional banks while the effect of NIM is negative and insignificant at 5percent. CAR is also negative and insignificant in Islamic banks. The study and result is like what was reported earlier by Kurna (2012). In his study of determinants of liquidity of commercial banks in Hungary, Vodova (2013) submits that capital adequacy ratio and profitability are positively related to liquidity while size of the bank and monetary policy on interest are negatively related. He says that the relationship between gross domestic products (GDP) and liquidity is ambiguous. According to him, bank liquidity decreases with the size of bank. This means that big banks rely on the interbank market or on the liquidity assistance of the

Lender of Last Resort while small and medium sized banks hold buffer of liquid assets. This supports the hypothesis of ‘‘too big to fail’’ (Kaufman, 2013). The author maintains that during financial crisis, profitability of many banks declined substantially and liquidity remains almost unchanged or declined slightly. This is also in line with the submission of Bonfim & Kim (2012) that the regulation of Systematically Important Financial Institutions (SIFIs), the so called ‘too big, too systematic or too interconnected to fail’ may play an important role in mitigating the specific component of liquidity risk.

Furthermore, Bonfim and Kim (2012) while looking for evidence of herding behaviors among banks with emphasis on the period preceding the global financial crisis reveal that interbank ratio, measured as the ratio between interbank assets and interbank liabilities may also be an important input in assessing liquidity risk. They also suggest that the ratio between credit granted and deposits taken from customers provides a broad structural characterization of banks’ main funding risks. Similarly, while analyzing the determinants of bank liquidity risk within the context of Euro area, Cucinelli (2013) posits that assets quality impacts only on the measure of short- term liquidity risk. He says banks that specializes on lending activity are more vulnerable to funding structure. Moreover, Siaw (2013) examines the determinants of liquidity risk of Ghana banks and how it affects their profitability. Using an unbalanced data set of 22 banks over a period of ten years (2002-2011), he employed random effects Generalized Least Square (GLS) regression based on Hausman test to estimate the determinants of bank liquidity risk. His result shows that bank size, Non-Deposit Dependence (NDD) and inflation have significant positive relationship with liquidity risk. He contends that while ownership structure does not affect liquidity risk significantly, ROA and ROE show significant correlation with liquidity risk.

Recently, Mehmed (2014) examines the extent to which banks in Bosnia and Herzegovina are exposed to liquidity risk. He argues that the most important determinants of liquidity in the banking sector vary, depends on the definition of liquidity risk. The author defines liquidity risk using two parameters. L1 Risk he defines as liquid assets to total assets while L2 Risk is liquid assets to customer deposits and short-term funding. Using GDP, Capital Adequacy and Return on Equity (ROE) as independent variables, he concludes that most of the determinants have influence on liquidity risk of banks in the country. More recently, Jedidia and Hamza (2015) investigate the determinants of Islamic Banks liquidity using a panel of 60 Islamic banks in Middle East and North Africa (MENA) and Southeastern Asian countries. They observe that profitability of bank indicator (like ROA) positively affects the exposure to liquidity shortage. They also contend that CAR and the ratio of bank’s investment have statistically significant negative relationship with the liquidity risk measure. In line with previous researchers, they agree that bank size does not matter probably because small and large Islamic banks have difficulties in managing their liquidity risk. However, their position that GDP has negative but irrelevant association with liquidity risk is contentious. The above discussion suggests that various authors have identified different determinants of liquidity risks. While some of these determinants like ROA and bank size have been commonly identified by many authors, other determinants have not been thoroughly discussed. Yet, there seems to be conflicting results in the relationship of some factors to liquidity risk. The conflict could be because of the period and country of study. Besides, many determinants including profitability, regulation and supervision, capitalization and inflation have not been adequately researched. This creates opportunity for further research in this area.

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Immunological Effect of Amritadi Kwath For Improving Immunity To Fight Covid -19 Pandemic

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Abstract- COVID -19 is a respiratory disease caused by a coronavirus (SARS Cov -2). Coronaviral proteins is responsible to disrupt the immune response pathway and breakdown the immune system. In Ayurvedic system of medicine Amritadi Kwath may be effective for immunity booster drug to healthy people for improving immunity to fight COVID -19 pandemic . But Amritadi Kwath to be used freshly prepared ,and shelf life is (½ -1 day) .Which is major drow n back of Amritadi Kwath to the large scale production.

In this perspective it is an urgent need to Randomized double blind placebo controlled trial of Amritadi Kwath formulated Ghana satva converted in to AMRITA Tablet form on COVID -19 positive patient for more improving immunity to fight COVID -19 pandemic.

Index Terms- Amritadi kwath , Gnana satva, Amrita Tablet, covid-19, immunomodulator.

I. INTRODUCTION

COVID -19 is a respiratory disease caused by a coronavirus (SARS Cov -2). Coronavirus is enveloped virus with a positive sense, single -stranded RNA genome. The coronaviral genome encode four major structural proteins, the spike (S) protein, nucleocapsid (N) protein, membrane (M) protein, and the envelope (E) protein, all of which are required to produce a structurally complete viral particle .

The coronavirus disease (COVID -19 is highly transmittable and pathogenic viral .Coronaviral proteins is responsible to disrupt the immune response pathway and breakdown the immune system. In the absence of effective inhibition patient suffer prograssive immunological damage and develop upper respiratory infection(URTIs).Lower respiratory tract infection (LRTIs) and severe acute respiratory syndrome (SARS). Currently there are no approved therapeutic agent available for coronavirus.

Thus there is an urgent public health need for rapid development of novel interventions.

Ayurveda is the natural system of health care all over the World. Ayurvedic medicines as the major remedy in traditional medical system, have been used in medical practice for thousands of years and have made a great contribution to maintaining human health.

Ministry of AYUSH recommended the self care guideline for prevention health measures and boosting immunity with special reference to respiratory health. In this

perspective AMRITDI KWATH may be immunity booster drugs. Amritadi Kwath which mainly constituent of Guduchi. *Tinospora Cordifolia* willd Hook f & Thonus, Ashwagandha *Withania Somnifera* L. Dunal, Yashtimadu *Glycyrrhiza glabra* Linn, Tulshi *Ocimum sanctum* Linn, Pipali *piper longum* linn.

Guduchi *Tinospora cordifolia* has been reported to benefit the immune system and successfully immunomodulator efficiency (K. G. C. Dissanayake. et. al 2020) Extract of *T cordifolia* has also may be effective in immunodeficiency virus. (HIV) (Kaliker MV. et. al 2008) Ashwagandha *Withania Somnifera* Withania has been reported to benefit to immune system and immunomodulatory activity (.Davis. L. et. al 2000. P. Amaravati et. al 2012) Yashtimadhu *Glycyrrhiza glabra* has been reported that immunomodulatory activity (Papaya Mitra muzamder et. al 2012, Kashif Hussein et. al 2017)Tulsi *Ocimum sanctum* has been reported to immunomodulatory activity (C. R. jaba et. al 2011, Gayatri Nahak et. al 2014) and Pipali Piper longum has been reported to immunomodulatory activity (E.S.sunala et. al 2004) Satyapal Singh et. al 2015 has been reported that Guduchi leads to immunomodulator by activating the lymphocytes, Tulsi act by modulating the humoral immunity , Ashwagandha act immunomodulating cellular immunity, Pippali works via modulation of both specific and non specific immune response .Yashtimadhu also evaluated for its anti-viral activity against HIV, validating its immunomodulatory effect.

Thus prepared Amritadi Kwath to clinical trial on healthy people for talking as an immunity booster drug to protect transmittable coronavirus infection.

II. MATERIAL AND METHOD

Procurement and preparation of plant material.

The crude drugs mentioned in Bhavaprakasha Nighantu (Indian Materia Medica) .The preparation of AMRITADI KWATH were taken from the pharmacy of Ravindra Nath Mukharje

Ayurveda college and Hospital Motihari, after proper authentication by the Department of pharmacognosy of the Institute. Then, the physical impurities were removed and drugs were washed with water, sorted and sun dried below 45oc. Dried drugs were stored in tightly closed containers. The crude drugs used in Amritadi Kwath with their botanical identities and parts used are given in Table -1

Table -1 Crude drugs of Amritadi Kwath

Botanical Name.	Fam .	Part used
Tinospora cordifolia. <i>Guduchi</i>	Menispermaceae.	Stem.
Withania Somnifera. <i>Ashwagandha</i>	Solanaceae.	Root.
Glycyrrhiza glabra. Yastimadhu	Fabaceae.	Root
Ocimum sanctum <i>Tulsi</i>	Labiatae	Leaf.
Piper longum. <i>Pipali</i>	Piperaceae.	Fruit.

Preparation of AMRITADI KWATH

Preparation of AMRITADI KWATH to be considered flowing pharmaceutical Factors.

Vessel for Amritadi Kwatha, Proportion of water, Temperature, Particle size of Amritadi Kwath Dravyas (Drugs used for decoction), Duration of heating, and Analytical study of Amritadi Kwatha.

1 Vessel to be used for Amritadi Kwath---Vessel imparts a specific role in Amritadi Kwath

preparation. In ancient time earthen pot was used having qualities such temp regulation, alkaline in nature, doesn't take part with chemical reaction with ingredients which are under processing. Also due to its narrow opening it can control vapors within hence the important active principles can be saved. Now a day stainless steel vessel can be used due to easy availability, less costly and easy for maintenance.

2. Proportion of water -- proportion of water to be added for Amritadi kwath preparation is important factor. Different proportion of water (4, 8 and 16) mentioned in classic depends on the hardness as well as on quantity of the drug used. Some Acharya has mentioned that the proportion of water may be decided on the basis of the quantity of drug taken. However, most of the times, it is difficult to judge the consistency of drugs, especially when the contents are poly herbal. Hence, an emergence need is required for qualitative and quantitative study to standardized quantum of heat and time duration.

3. Temperature --Regulation of temperature protects heat labile phytoconstituents. Madhyamagni is the term used to denote mild-to-moderate heat in preparation of kwath. Temperature holds the significant factor in preserving thermolabile active constituent Therefore, during the preparation of Amritadi Kwath temperature may be maintained between 85 and 90°C.

4 Particle size --In conventional method of Kwath exact particle size of raw drugs is not mentioned. Most of the scholars use powder of raw drugs as Yavkut churna (Coarse powder). Mostly 60-100 size can preferred for Amritadi Kwath purpose.

5. Duration of heating--

One fourth and one eighth of original volume of water are the terms used in ancient methods of Kwath preparation. The degree of heating depends on Laghutwa (Easy to digest) and Gurutwa (Hard to digest) of Amritadi Kwath,

On the basis of above principle the authenticated crude drugs were crushed to a coarse powder separately and then mixed

thoroughly with 8 parts of water in a stainless steel container and then continuous mild heat was applied until it was reduced to one-fourth of its initial quantity. During the heating process, continuous stirring was done to facilitate the evaporation and avoid any deterioration due to burning of materials. After a desirable reduction in volume was achieved, the Kwatha was filtered through single folded cotton cloth and collected in a separate Vessel. Amritadi Kwath were subjected to various analytical parameters as Organoleptic parameters, Physico-chemical parameters and phytochemical screening parameters.

Clinical aspect

I have selected 50 healthy people for clinical trial of Amritadi Kwath. Out of 50 healthy people 40 were male and 10 people female, the age varied from 18 to 70 years. I have applied 20 ML to 40 ML Amritadi Kwath daily for 2 week.

RESULT

The Organoleptic characters of Amritadi Kwath were the following :

Rupa(color) was dark brown, Rasa (taste) was bitter, Ganda (odor) was characteristics due to the specific properties of the various ingredients and sparsha (consistency / texture) of Amritadi Kwath was liquid as given in Table -2

Table -2 Organoleptic parameters of Amritadi Kwath.

Parameters.	kwath
Color.	Dark brown
Taste.	Bitter
Odor.	characteristic.
Form.	Liquid.
pH of the Amrita Kwath was 4.53 ± 0.03, loss on drying in Amrita Kwath was 3.4 ± 0.20% w/w as given in Table 3.	

Table -3 Physico-chemical parameters of Amritadi Kwath.

Parameters.	Kwath
PH at 5% aqueous solu	3.50+ - 002
Lass on drying at 110oc (%w/w)	2.4+- 0.03
Specific gravity.	5.2 + 0.20
Total solid content. (% w/w)	-
Ash valu. (% w/w)	-
Acid insoluble Ash. (% w/w)	-
Water soluble extractive Ash (% w/v)	-
Methanol soluble extractive. (%w/v)	-
The number in parentheses indicate the number of sample / determination carried out.	
Preliminary phytochemical screening reveals the presence of tannins, alkaloids, saponins, glycosides and flavonoids etc. in the Amritadi Kwath. given in Table 4	

Table - 4 Preliminary phytochemical screening of Amritadi Kwath.

Phytoconstituents	Test performed	Results
Tannins.	Ferric chloride test.	+
Alkaloids	Dragendroff's test.	+

Flavonoids.	NaOH Solution test.	+
Glycosides	keller-Killani test.	+
Steroids.	Lieberman's test.	+
Terpenoids.	Salkowski's test.	+
Anthraquinones.	Benzene test.	-

(+) Denotes presence of Phytochemical
(-) Denotes Absence. of Phytochemical

Observation

At the end of 2 week It can be observed that the people realize the natural stamina, strength and ability of the body, mind emotions, and in some people the body weight positively increased. It can be observed that Fever, cough, difficulty breathing tiredness, Nasal congestion, runny nose, sore throat, and severe disease as Asthma, bronchitis, pneumonia. etc did not appear after 12 week used of Amritadi kwatha.

III. DISCUSSION

On proper investigative search, it has been seen that Amritadi kwatha becomes base material for most of the available dosage forms among Ayurvedic medicaments. Hence, to establish our assumption, literature and research papers with probable possible dosage forms were searched where Amritadi Kwatha acts as base material and it can be thoroughly explored with the advantage of these dosage forms in the context of their effectiveness and safety, but they are to be used in fresh state due to less stability, inconvenience to prepare fresh Amritadi Kwath every time needed etc.

The Comparative study of Amritadi Kwath, I observed that the process of the Ghana satva is considered to be similar to the aqueous extraction of the drug. It is considered to contain all the active principle as that of the whole drug. So advantage in using Ghana satva it higher concentration, lower dosage, and longer shelf life.

Thus Amritadi Kwath formulated Ghana satva converted into AMRITA TABLET form may increase the self life make it higher concentration, lower dosage, better bio availability and easy to dispense for dose fixation. Prepared Amritadi Kwath formulated Ghana satva Converted into AMRITA Tablet following procedure.

Preparation of AMRITA TABLET.

The Amritadi Kwatha can be boiled again over slow fire on a gas stove, maintaining the temperature between 90°C and 95°C till a semisolid consistency is obtained. As the water evaporates, the viscosity of the extract increases, resulting in Ghana satva form. Then, the Ghana satva can be mixed with the Churna of Amritadi Kwath (up to 10% of extract) further forming a solid mass.

The solid mass (Ghana satva) can be forced through a no. 16 sieve and granules were prepared and then dried at 50°C in a hot air oven for 10 hours. The dried granules were passed again through a no. 20 sieve. The formulation can then be compressed in a single-punch tablet press with a target weight of 500 mg.

The *Amrita Tablet* can be subjected to various analytical parameters as follows.

Organoleptic parameters, Physico-chemical parameters, Quantitative tests for tablet as Weight variation test, tablet hardness test, tablet disintegration time and friability. Qualitative tests for various functional groups.

Chromatographic analysis: Thin layer chromatography (TLC) High performance liquid chromatography (HPLC), Nuclear magnetic resonance spectroscopy (NMR), Mass Spectrometry (MS) and Heavy metal analysis, pesticide residue value, Microbial overload and fungal growth study can be carried out. Afterwards to determine acute toxicity test and long term toxicity test on animal species for assessing the safety of AMRITA Tablet as follows.

Acute toxicity test

Animal species --- Rodents species can be selected.

Sex --- Male and female mice can be used

Number of Animals --- Each test group can consist of last five per sex.

Route of administration -- oral route

Dose level --- A sufficient number of dose label can be used in mice to determine the appropriate lethal Dose.

Duration of study -- Duration of acute toxicity test evaluation seven to fourteen days.

Observation --- Toxic signs and the severity on set progression and reversibility of the signs can be observed and recorded in relation to dose and time. Mice during the observation period can be autopsied. If necessary a histopathological examination can be conducted on organ or tissue showing microscopic change of autopsy.

Long term toxicity test

Animal species -- Rodents species can be selected.

Sex -- Male and female mice and rats can be used.

Number of Animals --- Each test group can consist of at least five mice per sex and three rats per sex.

Route of Administration --- Oral route.

Administration period -- The period of administration of the test substance to mice and rats will depend on the expected period of clinical use.

Observations and examinations

Observation and examination can be performed on the following items.

1 General signs, body weight and water intake.

2 Haematological examination.

3 Renal and hepatic function tests.

4 Other Function test.

5. Animals found dead during the examination can be autopsied as soon as possible. A macroscopic examination can be made of Organs and tissues.

6. In order to maximize the amount of useful information that can be obtained during the administration period, all moribund animals can be sacrificed rather than allowed to die. period to sacrifice, clinical observation can be recorded and blood sample collected for haematological and blood chemical analysis.

Recovery from toxicity .

Then evaluate the immunological efficacy of AMRITA Tablet on COVID-19 positive For improving immunity to fight COVID -19 Pandemic, as follows.

Human Pharmacology (phase I)

The objective of the safety in this phase is the estimation of safety and tolerability with the initial administration of Amrita Tablet on Covid -19 Positive. In this phase can be applying Amrita Tablet in healthy volunteers and certain type of patients.

Maximum tolerated dose -- To determine the tolerability of the dose range expected to be needed for later clinical study and to determine the nature of adverse reaction can be expected

Therapeutic Exploratory Trial (Phase II)

Therapeutic exploratory trial (phase II)--studies on a limited number of COVID -19 positive patient to determine clinical efficacy and to further confirm safety. This trial can be preferably designed as randomized, double -blind, controlled study , using for control groups either an alternative treatment or a placebo.

The objectives of phase II study can include evaluation of potential study endpoints, therapeutic regimens and target populations (mild versus severe disease) for further study.

Therapeutic Confirmatory Trial (phase III)

Therapeutic confirmatory trial (phase III)-A larger COVID -19 positive patient group can usually study a randomized double blind design to validate preliminary evidence of efficacy obtained in earlier study.

Study in phase -III can designed to confirm the preliminary evidence accumulated in phase II ,that AMRITA TABLET is safe and effective then can be use in the intended indication and recipient population

IV. CONCLUSION

It is my concussion that Amritadi Kwath may be effective immunity booster for improving immunity. Amritadi Kwath may be act on improving vitality, mental faculties and promoting longevity .

Amritadi Kwath has no adverse side effect and other complications even long term use in therapeutic dose. In this conclusion I would like to say that there is an urgent need to Randomized double blind placebo controlled trial of Amritadi Kwath formulated Ghana satva converted in to AMRITA Tablet form on COVID -19 positive patient for more improving immunity to fight COVID -19 pandemic.

Institutional Ethics committee has approved for conducting clinical trial of Amrita Tablet on COVID -19 positive patient. After receiving CTRI Number by Clinical Trials Registry - India. ICMR- National Institute of Medical statistics, Will be Conducting clinical trail.

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A Review: The hurdle technology- Self-preservation technology in cosmetics

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Abstract: Preservatives are added to product for basic reasons; that are to prevent microbial spoilage and thus to prolong the quantity of your time of the merchandise; and to protect the merchandise itself and customer from a possible infection. Although chemical preservative prevents microbial growth, and enhance their time period, now a days their safety is questioned by a growing segment of consumer. Therefore, there is a considerable interest within the event of preservative free or self-preservative cosmetic. In this paper, traditional/chemical preservative are replaced by other cosmetic ingredients with antimicrobial properties. And this is often commonly referred to as hurdle technology. "Hurdle technology", a technology that has been used for the limit of product protection inside the chow conscientiousness since 1970s, has besides been functional for the assembly of self-preservative cosmetic. 'Hurdle technology' could even be a term want to describe the intelligent combination of various preservative factors or hurdle to deteriorate the expansion of microorganism. faithfulness to existing good manufacturing practice, appropriate packaging, delicate careful selection of the form of the emulsion, low water activity and low or high pH values are significant variables for the control of microbial growth in superficial formulation. This review article describes the appliance of the essential principles of 'hurdle technology' within the assembly of self- preservative cosmetic. Multifunctional antimicrobial ingredients and plant derived essential oils that are used as alternative or natural preservative.

Keywords: Hurdle technology, natural preservative, self-preservative, multifunctional antimicrobial ingredients.

1. Introduction:

The microbial safety of cosmetics is usually of particular importance in industry, since microbial route can damage the merchandise, damage the skin or inherit contact with damaged skin and pathogens, which may endanger the health of the buyer and spread the infection. With exception of pure oily preparation like petrolatum, body oils or lipsticks, the rich composition of recent cosmetic compositions alongside the aqueous medium is right soil for the propagation of microorganism. Preservatives are antimicrobial chemicals added to cosmetics to protect them from microbial disorders caused by raw materials, production, and consumers.

Paraben, the foremost widely used preservative in the world, has negligible estrogenic properties [1]. In December 2005, the security assessment of parabens was resumed after consideration of the cosmetic ingredients. Because there is a suspicion of a connection between the presence of parabens in breast issue and breast carcinoma [2,3]. In recent years, there has been a growing interest within the development of preservative-free cosmetic formulations. Preservative-free aqueous formulation are often made microbiologically stable by sterile production and appropriate packaging. However, this approach might not work for the foremost aqueous cosmetics packaged in multiple-use containers. It is to be remarked that the common definition for preservative-free means the merchandise does not contain substances that are classified as preservatives consistent with the cosmetic legislation. Therefore, the term 'Hurdle technology' (self-preservative) is more appropriate than preservative-free. The principles of 'Hurdle technology' also are applied for the assembly of self-preserving formulations.

The goal is to dam the expansion of microorganisms by fixing in their path various impediments that ought to each reduce the microorganism number but not kill the whole population. Each impediment should permit a diminished surviving population so as that because the quantity of impediments grows the number of survivors is going to be decreased and eventually reach zero. Number of the organisms may overcome the primary hurdle; of these that survived, some may overcome the second then forth until none survive the last hurdle [9]. This review article briefly reviews the techniques used for the assembly of non-classically preserved cosmetics following the concept of 'hurdle technology'. Multifunctional ingredients, plant-derived essential oils with antimicrobial properties that are used as alternative or natural preservatives.

➤ The principles of the self-preserving technology Hurdle are presented below;

1. Good manufacturing practice (GMP)
2. Appropriate packaging
3. Water activity
4. pH control
5. Multifunctional antimicrobial ingredients.

2.Types of micro-organism:

There is no right preservative or wrong preservative for every situation as there is no right or wrong stabilizer for every formula. The choice of ingredient that is used is, even today, largely empirical. Because when preservation is mentioned microorganisms come to mind, those that are found in cosmetics as contaminants are gone over in detail.

2.1 Fungus: A fungus is any member of the group of eukaryotic organisms that has microorganisms like yeast and molds.

Molds: -

Molds are filamentous fungi and are widely distributed throughout the earth in soil and water, and as parasites in plants and animals. They are unicellular and multicellular fungi. Their average size is about 30 micron in diameter. Molds grow best at room temperature. They require moisture and darkness to grow. The pH must be between 2 and 5.5, but the only pH for them is 4.5 to 5.5. They go to not grow in an alkaline or neutral environment. [36]

The followings are probably the most frequent molds found in cosmetics: Examples are

- a) Penicillium
- b) Aspergillus
- c) Rhizopus
- d) Mucor Mucedo.

Yeast: -

Yeast are unicellular organisms containing no chlorophyll, but they may contain pigments (yellow, pink, red, green, or black) . They are doing not form hyphae, are avoid or spherical in shape, and average about 5 micron in diameter, but they are going to be anywhere from 5 to 30 micron in length. Most yeasts will grow best on any medium containing fermentable sugar, will grow over a pH range of 2.2 to 8 (although most yeast prefer acid conditions), and usually grow best at room temperature. They usually require an abundant amount of oxygen to grow. The next are probably the most frequent yeast found in cosmetics[36].

- a) Saccharomyces
- b) Cryptococcus
- c) Candida
- d) Zygosaccharomyces.

2.2 Bacteria: -

The bacteria are much more difficult to generalize about than either molds or the yeasts. Most bacteria are quite small, around 0.5 to 3 microns, bacteria are single celled organisms that reproduce by binary fission, are affected by osmotic pressure and surface tension, and usually killed by high temperature.

some bacteria those are found in the environment are beneficial as well as harmful. The pH required to grow that between 7.2 to 7.6. examples are:[36]

- | | | |
|-------------------------|---|-------------------------------|
| a) Bacillus subtilis | } | these are harmful bacteria |
| b) Staphylococcus albus | | |
| c) Escherichia coli | | |
| d) Lactobacillus | } | these are beneficial bacteria |
| c) Bifidobacterium | | |
| f) Monococcus. | | |

Following table illustrates the types of microorganism grow in water and oil.

Table 1:- Illustrating the types of microorganism grow in water and oil.

Microbes grow in water	Microbes in oil
1) Escherichia coli	• Pseudomonas
2) Vibrio	• Bacillus subtilis
3) Salmonella	• Corynebacterium sp.
4) Cyanobacteria	• Micrococcus roseus

3. Mechanism of preservative:

Preservatives counter the microbial growth in many ways. Some lead to cell wall lysis and leakage of the cell wall (e.g., phenols, organomercurials) or irreversible crosslinking at the cell wall (e.g., glutaraldehyde), while some interfere with the integrity of the plasma membrane (e.g., chelators such as EDTA, quaternary ammonium compounds). Weak carboxylic acid and alcoholic preservatives interfere with active transport mechanisms. For example, parabens and benzoic acid inhibit folic acid synthesis. Unfortunately, microorganisms become resistant to antimicrobial preservatives in multiple ways. These include one or more of the following mechanisms: (a) efflux transport mechanisms, (b) enzymatic inactivation of the antimicrobial preservative, or (c) alternation of the organism’s own metabolic pathways. Some species of bacteria develop resistance to antimicrobial preservatives through genetic mutation, transduction conjugation, transformation, or transposition. These types of resistance make antimicrobial testing a critical task (29) .

4. Needs of preservation and factors:-

1. The use of preservative in cosmetics is essential to prevent alterations caused by microorganisms and contamination during formulation, shipment, storage or consumer use.
2. Antioxidants can also be used to protect alteration caused by exposure to oxygen.

Factor affecting the action of preservatives in cosmetics:

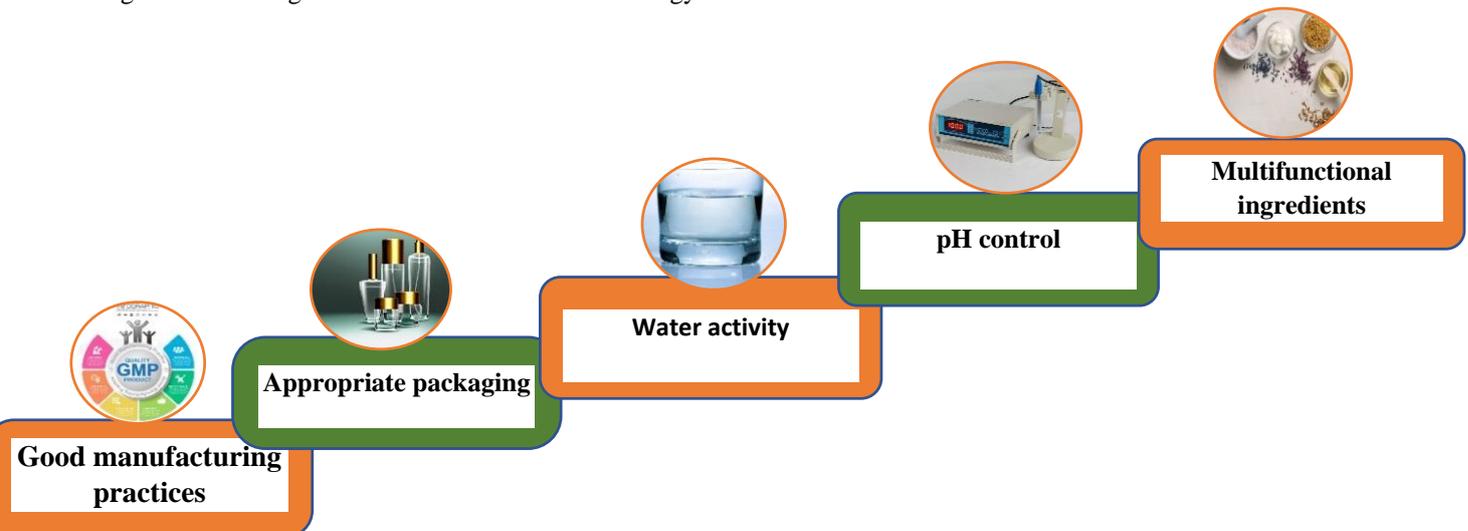
Fig 1:- Illustrating factors affecting the action of preservative in cosmetics

- 1) • Concentration – more concentrated the preservative, more effective it will be & wide range of its activity .
- 2) • pH – microorganisms of one sort or another are capable of growing between pH 2 – 11, many preservatives are pH – dependent.
- 3) • Surfactants – certain cationic surfactant have strong anti-microbial properties when used in combination with antiseptics. soaps & anionics exerts mild antimicrobial properties at high conc. Non-ionics surfactants inactivate the preservatives & and also serve as source of energy for bacteria.
- 4) • Solubility relationships – more soluble derivatives shows a lower inhibitory capacity.
- 5) • Partition coefficient- preservative molecules will distribute themselves between the aqueous phase, oil phase, surfactant micelles by solubilisation, and solutes by competitive displacement of water. thus, the available preservative concentrations in each of these phases will be reduced.

5.material and method:

The principles of the self-preserving technology i.e. Hurdle technology are presented below, in fig no.2

Fig 2: - Illustrating various factors of hurdle technology.



5.1 Good manufacturing practice:

Good manufacturing practices standards need to be adhered strictly during the assembly of cosmetic products when either traditional or alternative preservatives are used. Preparation of the cosmetic product under strictly aseptic condition should hinder the entry of microorganisms. Water filtration and radiation system, positive pressure, microbial testing of raw materials, disinfection of the equipment and properly trained and dressed personnel can significantly reduce the danger of contamination [9-10]. Thus, the utilization of strictly aseptic conditions during the assembly of cosmetic is proposed, especially when a self-preserving system is employed within the formulations.

5.2 Packaging and product preservation :

If the use of preservative-free or self-preserving formulas are to be realize, then the application of the better protective cosmetic packaging must be considered a hurdle. Inclusive in this concept is the use of delivery devices which do not allow contamination to occur during use. Such as for example flip-caps for shampoos and pump-tops for lotions are example of containers that help reduce contamination during in use condition. While single-use container is an obvious solution to the problem, other more

imaginative solutions are being developed [9-10]. In recent year such type of containers are used to preserved the product without preservative in container that can dispense product without contamination.

5.3 Water activity and pH control

As microorganisms require water for growth, formulations that limit the availability of water for microorganisms help control microbial growth and become one of the hurdles placed in the organism's path. The water activity (a_w) describes the quantity of biologically available water within cosmetic formulations and is decided by comparing the vapor pressure of the formula containing water with the vapour pressure of pure water. Water activity may be reduced by the use of water binding substances, such as salts, polyols, protein hydrolysates, amino acids and hydrocolloids [11]. Different classes of microorganisms have different tolerance to low tide activity; bacteria generally have higher water requirements than yeasts, and yeasts higher requirements than molds [12]. Gram-negative bacteria show more susceptibility to low water activity (a_w) values than gram-positive. Sorbitol and glycerol, in concentrations of around 20% w/w, are most ordinarily used to reduce water activity. However, high concentrations of polyols tend to offer the product a sticky feeling [13]. Recently, a glycerylpolyacrylate gel consisting of water, sodium polyacrylate and polyols like glycerin and ethoxydiglycol has been described for the successful preservation of oil in water (O/W) and aqueous formulations [14]. This new family of transparent, highly viscous hydrogels absorbs water from its surroundings and thus deprives microorganisms of the free water necessary for their survival. Furthermore, the hydrogels are non-toxic, non-irritant and exhibit high skin moisturizing properties[16].

5.4 Multifunctional antimicrobial ingredients:

According to European regulation, the only permitted preservatives are those that are listed in annex four of the 7th amendment of the cosmetic directive. However, many cosmetic ingredients, such as alcohol, essential oil, surfactants, fatty acid, antioxidants, biomimetic phospholipid, chelating agents, have antimicrobial property. These materials which are used for their beneficial effect on the skin and may coincidentally contribute to the preservation of the formulation are not listed as preservatives of the formulation in annex four. By a careful selection of these ingredients, it is possible to decrease or to eliminate the use of traditional/chemical preservatives and to formulate cosmetics with improved cosmetic properties. Below are listed some alternative preservatives[16].

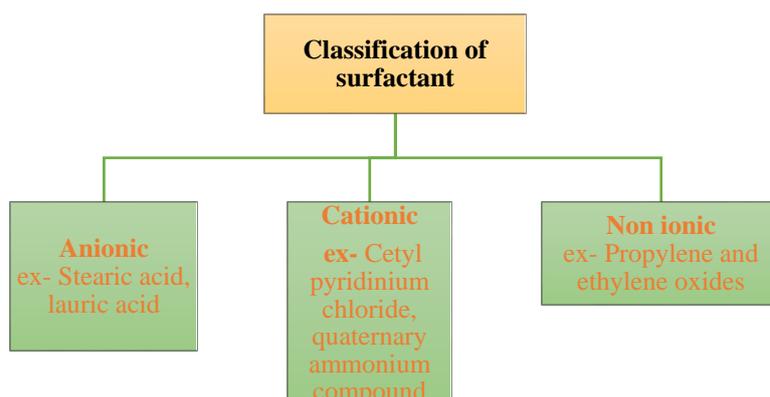
- 1) Surfactants
- 2) Fatty acid and ester
- 3) Biomimetic phospholipids
- 4) Antioxidants as preservatives
- 5) Aroma chemicals as preservatives
- 6) Chelating agents as preservatives potentiators:
- 7) Fragrance ingredients

1. Surfactants in self-preserving formulas:

Surfactants are classified as anionic, cationic or non-ionic, when present in aqueous solution at concentrations above their critical micelle concentration (CMC) surfactants can form micelles. Preservatives absorbed or enclosed in micelles have decreased preservative efficacy due to a reduction in preservative concentration. Surfactants on the other hand may help solubilize preservatives thereby making them more effective[19].

Following figure illustrating the classification of surfactant.

Fig 3-classification of surfactant.



a. Anionic Surfactants:-

Anionic surfactants such as fatty acid soaps are the earliest example of an anionic compound helping preserve products. These anionic surfactants have weak antibacterial effects under alkaline conditions and generally are more active against gram positive rather than gram negative organisms. The general resistance of gram- negative organism is due to the protection afforded by their outer membrane. This protection can be lowered or reduced by the concurrent use of chelating agents[19].

b. Cationic surfactants:-

Ionize in aqueous solution to produce positively charged organic ions that are responsible for surface activity. Since 1935 when Domagt identified the antimicrobial effects of cationic surfactants, quaternary salts (e.g BAC, CPC) have been used in sanitizers, cosmetics, mouthwashes and toothpastes. Benzalkonium chloride (BAC) and cetyl pyridinium chloride (CPC) are most often used in such formulations. Their presence reduces and eliminates the need for additional preservatives. One advantage of quats are their broad spectrum of antimicrobial activity over a range of pH values[19].

2. Fatty acids and esters as multifunctional components :

Medium chain saturated carboxylic acid acids, like heptanoic (C7), caprylic (C8), capric (C10) and dodecanoic acid (C12) and their esters with glycerine or propanediol are found to possess activity against enveloped viruses and various bacteria and fungi in vitro [19–21]. Inhibitory properties in terms of minimum inhibitory concentration (MIC) values reach a peak with C12 aliphatic chains and reduce rapidly at values but 8 or greater than 12 [17]. The mechanism by which the monoglycerides kill bacteria has not been completely elucidated yet, but microscope studies indicate that they disrupt cell membranes, leaving the bacterial cell intact [18–21].

3. Biomimetic phospholipids:-

Phospholipids are another example of emulsifiers which may have special properties. While some phospholipids (lecithin) can inactivate preservatives, lipids which mimic structure and performance of phospholipids are prepared that have antimicrobial activity. This new family of phospholipids has been developed during which the arrangement of the phosphate and quaternary groupings has been reversed. Instead of interfering with preservative systems the biomimetic phospholipid displays potent antimicrobial activity without showing significant toxicity or skin irritation effects [19].

4. Antioxidants as preservatives:-

The primary function of phenolic antioxidants is to delay the auto-oxidation of unsaturated oils that would influence the colour and therefore the odour of the merchandise. Primary antioxidant is phenolic compound. Butylated hydroxyanisole (BHA) butylated hydroxytoluene (BHT), tertiary butylhydroquinone (TTBHQ) and propyl gallate (PG) are the foremost common phenolic utilised in cosmetics. BHA and TBHQ are the foremost effective antimicrobial of the phenolic antioxidant and are foremost active than the standard parabens. Although, better effective against gram positive organism, these phenolics are active against certain gram-negative organisms also as mold and yeasts. Propyl gallate is quite a water-soluble molecule with antioxidant and antimicrobial activities against bacteria and fungi at a degree of concentration 0.5% (w/w) [13]. Other examples are Caffeic, coumaric and ferulic acid have also demonstrated antimicrobial activity [28– 32]. The selection of antioxidant depends on the convenience of corporation, composition of the merchandise, the order of addition and packaging. Safety, compliance with governmental regulations and price should be considered. Final selection of the “hurdle” to be utilized in a preservative system depends on the precise of the formula, the manufacturing process and therefore the end use by the buyer [19].

5. Aroma chemicals as preservatives:

Spices and essential oils have long been wont to prevent the deterioration of cosmetic products. Because most studies for evaluating essential oils and fragrances used agar streak or disk method, true efficacy of the many extracts weren't properly evaluated. Despite these short comings the antimicrobial properties of aromatic substances were found to be useful. Aroma chemicals are multifunctional in order that their use in cosmetic products shouldn't only be supported the specific scent but also upon its inherent germicidal properties [19]. The phenol coefficient may be a measure of the bactericidal activity of a chemical compound in reference to phenol. The activity of compound is expressed because the ratio of dilution during which it kills in 10 minutes but not in 5 minutes under the required conditions. It is often determined within the absence of organic matter, or within the presence of a typical amount of added organic matter. In contrast, a phenol coefficient that but 1 means the disinfectant may be a smaller amount effective than phenol.

Table no. 2 Essential oil and their phenol coefficient. Mention in text

Essential oil	Phenol coefficient
1) Oil of clove	9
2) Oil of thyme	15
3) Oil of cinnamon	9
4) Oil of rose	6
5) Oil of lemon	4
6) Oil of eucalyptus	4
7) Oil of lavender	5

6. Chelating agents as preservatives potentiators:

The chelators, EDTA, carboxylic acid, acid and phytic acid increase the permeability of cell membranes and make them more sensitive to antimicrobial agents. additionally, chelating agents block the iron needed for microbial metabolism and growth. Thus, chelators could be important ingredients in enhancing the efficacy of antimicrobial agents for the control of gram-negative bacteria which are known to possess increased resistance to antimicrobial agents [27,28].

7. Fragrance ingredients:-

The chemical composition of antimicrobial fragrances isn't an excessive amount of various from antimicrobial essential oils and extracts. within the past, a fragrance mixture mainly comprised of benzyl acetate, phenethyl alcohol and Linalool which was utilized so on reduce the quantity of parabens utilized in cosmetic formulations [35]. At now, antimicrobial perfumes are commercially available, p-anisic acid (p-methoxy-benzoic acid) and levulinic acid (4-oxopentanoic acid) being the foremost components of them. p-Anisic acid is found in Pimpinella anisum and other herbs and levulinic acid has been found as by-product within the assembly of diosgenin from wild yam (*Dioscorea villosa*) [15]. However, replacement of the chemical preservatives by fragrance ingredients won't necessarily ensure a reduction within the irritating effect of the formulation.

Conclusion: -

This new preservative system approach for product protection includes compounds (hurdle) that have multi-functional activity and packaging components which will contribute directly or indirectly to keeping the environment hostile to microorganisms. Preservative free or self-reserving formulas offer numerous advantages. Studies that on some traditional/ chemical preservatives i.e. parabens, formaldehyde releasers and isothiazolinones together, increased the desire of consumers, for 'natural' products that has led the cosmetic industry to the enhancement of latest preservation methods. The devotion to modern GMP and therefore the use of appropriate packaging together with the control of crucial factors for the expansion of microorganisms i.e. water activity (aw) and pH can remarkably decrease the number of traditional/chemical preservatives needed for the stableness of a cosmetic formulation. In self-preserving formulations, old preservatives are replaced by other chemical ingredients with antimicrobial properties i.e. surfactants, fatty acid, chelating agents, essential oils, etc. These materials which are used for his or her beneficial effect on the skin and coincidentally contribute to the preservation of the formulation. However, the utilization of such alternative or natural substances doesn't ensure complete elimination of adverse events, irritating effects or sensitization. The 'ideal solution' which can replace traditional/chemical preservatives and may be absolutely safe, effective and compatible for all applications has not been found yet and doubtless never will. This hurdle technology is that the ideal solution.

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Contemporary Emergent Issues In Decolonization And The Invented Africa

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Abstract- This paper will draw attention to the very idea of invented Africa, and the process of the invention with the hope that by understanding that process we may look into the possibilities of de-inventing invented Africa. Through this, the paper examines how the continent can rise to the socio-economic world based on its cultural and historical context and content, the paper also explores the process of rediscovering the self-autonomy of the Africans from the European imperialism this is to make my "audience especially those who have not appreciated the magnitude of the crisis faced by communities of color as a result of mass incarceration," to appreciate themselves. Hoping that this will permit you to express the power of your thought more liberally with the freedom to articulate the truth in brashness without showing any sense of disapproval. The chief purpose of this paper is to give Africans and any other person who is engaged in African studies the equipment for understanding the African experiences and his or her human situations in Africa furthermore, the paper critique the claim that Africa had to wait for the coming of Europeans for their social change or development to take place as an erroneous hypothesis of European social constructs. The paper tries to moderate this premise by arguing that Africans are not just passive victims of westernization. Africans are urged in this paper to wake up and rise to their rightful place in the global order. The writer used and analyzed pieces of evidence found in relevant African pieces of literature within the African context to bring to understanding the history and causes of the unfortunate perpetual decelerating underdevelopment of the African continent despite her enormous wealth.

Index Terms- Imperialism, colonialism, nationalism, development, underdevelopment, decolonization, invented, De-inventing, culture, education, Africanization, and Autonomy.

I. INTRODUCTION

I have chosen this topic because I assume that Mudimbe's work especially "*the invention of Africa*," really explain how Africans have gone through the colonial processes that have brought them where they are and which explains virtually most of the things that take place in Africa today and more so the very problematic problem of *decolonization*. Which I believe has been an issue in Africa. The projection that African economic and scholarship encounter with Europe (which was domination), led to her invention, this invention of Africa reflects the image of Europe in all the undertaking of Africa's activities, that Africa is duplicate of Europe, that our actions merely reflect the European values, we are invented. It on this account that the paper tries to bring into question these malevolent discourses of inventions. Hoping that we shall be able to decolonize some of the European construction canons of colonialism that categorize Africa(ns) based on the grid of European thought systems.

Now, "inventors" of Africa had a very specific objective, when you read Mudimbe's work, "*the invention of Africa*," page 1, it explains the creation of the western construct. A construct that would be easy to dominate, manipulate, and control the African person; with the very main objective of colonizing or colonization, which I still believe as we speak is economic exploitation. Now, this economic exploitation did just come from the blue skies it had its foundation on European constructs to the dominated, Mudimbe expound this and it is noteworthy, "but it can be admitted that the colonists (those settling a region), as well as the colonialists (those exploiting a territory by dominating a local majority), have all tended to organize and transform non-European areas into fundamentally European constructs."¹

This economic exploitation has led to some part of Africa suffering from imperils of poverty but, I also agree that some part of Africa has remained industrially underdeveloped mainly because of her unforgiving climatic conditions, this has led to some portion of African people in the northern part to invent better ways of survival. This is not our concern today. Our issue is the western construct and its intentions as well as its impacts on the African people. What is a construct? Anybody can formulate a construct with some aims to achieve, so also identity construct can

¹V.Y. Mudimbe, *The Invention of Africa*, Gnosis, Philosophy, and the Order of Knowledge (London: Indiana University Press Bloomington And Indianapolis, 1998), p. 14.

be constructed by the individual, groups in the society, race, tribe, clan, and can be constructed by anybody who feels that they want to distinguish themselves from others, in this case, the Europeans. So, when we talk about identity, I mean racial identity; a view of a certain race who have a view of themselves that they want to project to the world and how they want the outside world to see them and to recognize such projections as truth and legitimate. When these projections are successfully entrenched into the people's mind (dominated) then a discourse or bodies of knowledge are often constructed as truth around such projections to make them appear legitimate and as truth. Once they are accepted as truth, they become a body of knowledge sometimes supported as scientific knowledge that is authentic and incontestable. Yet, the postulation that one could without restrictions construct such a concept deprived of the subject's (dominated) involvement and then force them to accept and agree with it, appears to me as improper.

Social Construct Defined

The Europeans have a concept of themselves of how they see themselves vis-a-vis others, and how they want people to look at them as Europeans. Identity is constructed through many approaches and reasons, you can construct an identity around race, nations, region, generational and it depends on those reasons on which it is constructed, for example, at an international meeting, a country like Kenya can construct identity perpetuating that she is the best country that produces the best long-distance athletes or they are the only country that produces the best blending nice tea or coffee in the world. Which is true. But this is a positive construct. In many cases, people would like to construct a positive identity but for some reason, other people, because of their utilitarian interest may want to project a negative identity of social construct this normally is the source of many conflicts and underdevelopment. Because around this utility people end up creating very sophisticated nuclear weapons for conquering others, for prestige, and to subdue them in their economic subjugation.

Subsequently, people are trying to create so many identity constructs which they expect other people to know and see them in that manner, other examples can be feminism identity, which was constructed as an antinode of oppression by men, for example, 1840s women could not apply for policewomen because they were seen to be weak and can't run after a thief, so it was not a question but they were dismissed on such account. But now women are accepted in the militaries as a result of their struggle to insert their interest, affairs, rights, and integrity to be taken as part of the good feeling of a society where everyone feels at home, "for instance, a

key strategy employed by most women in their quest towards autonomy both at home and in the 'market' is the formation of strong alliances against men, as well as providing and receiving mutual help between matrilateral relations within multi-complexes. These alliances, like other gender specific associations, the Hair Dressers and Beauticians Association, Seamstresses Association, the 31st December Women's Movement, etc. constitute spaces where identities are created. They often operate as a discursively constructed feminine space partially removed from the practices of male domination. Such spaces provide many of these women with a profound sense of security, solidarity, and a means to express themselves in ways not possible in the male-dominated sectors of society."² Another example can be sexuality, especially homosexual and transsexual identity are also other social identities that are still struggling to make their ways to articulate, create and construct their own identity, despite being opposed by the church and the conservatives elements in the spectrum and whether it's good or bad is not our concern here, our concern is that they are a group that is trying to identify themselves by creating a construct that people will believe and know about them.

*Youths*³ are also coming up as social identity that must be respected before youths were seen as a stage in a society, a temporary stage to adulthood that would grow to be part of the society but now it's still a temporary stage but a very strong segment of society with its own identity pushing an agenda on how they want to be seen regarding, acknowledgment and employment, among others things that they see belongs to their space, etcetera since the future of the society relies on youths. We see many left-wing youth movements trying to chart their way because they feel that they are forgotten by society, they feel they are marginalized by the state or the society.

The Western Social Construct Discourses

The western social, economic, and political construct about Africans is a game of cultural imperialism and a kind of hegemonic relationship that forces the dominated side (Africans) to look up to the cultural influences of the dominant. Racial identity construct is directly connected with the pecking order of social relations where Africans are seen to be at the extreme end of poverty as engineered and concocted by colonialists for purposes colonization or neo-colonization to make Africans feel fundamentally inferior and lacking humanity so that they keep them out of any advantages in the global society. 'They are often been presented as robots who unquestionably accepted the dead weight of immemorial custom,'⁴ by western anthropologists, 'this picture was false and it is partly due to the microscopic methods

For both vanguards and clients, 'youth' as an identity bequeathed individual a sense of dignity and recognized position in nationalist discourse and public life. Their status as youth had meaning in either local or global discourses of power. See Jon Abbink Ineke van Kessel, *Youth, Politics and Conflict in Africa* (Netherlands: Koninklijke Brill NV, Leiden), 9 and 55. For more information about youths and politics and the problems they go through in Africa kindly See above mentioned author.

⁴ Alyward shorter WF, *African Culture And The Christian Church*, an introduction to social and pastoral anthropology, (London: Geoffrey chapman, 1973),p. 14.

² Wisdom J. Tettey, Korbla P. Pupilampu And Bruce J. Berman, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, (Netherlands: The Koninklijke Brill Nv, Leiden, 2003), 211

³ Youths are neither universally manipulated nor passive actors in a world designed by others but individuals who are trying to chart their own course... Two distinct forms of youth identity emerged. Vanguard youth defined themselves as a distinct historical cohort with unique access to resources of extraversion in the late colonial world. Client youth defined themselves instead in reference to 'timeless' principles of patronage and patriarchy.

of western anthropologists.⁵ So, culture in the racial discourse plays a very fundamental role especially in development areas because in the situation of societal development it is suitable to take culture as the fabric component of psychological, mental, emotional, and physical actions whose webs-chain clutch together across various cohorts of that society. In this manner culture shape *that* particular peoples' intellectual, emotional state, and define their daily practices and also it plays a role in defining their welfares and interests, through the inferring of those actions and experiences of their daily life, in this way values and believes are formed upon which they conduct themselves and behaves.

Consequently, any development and growth in African societies be it economic, politics and so on should virtually stem from the pedigrees of Africans values, and values stem from a culture because it in cultural values that a particular set of people draws their values; those artistic, aesthetics as well as ethical qualities that they think are basic and imperative in their daily relations with each other and with their cosmos.

Western Constructs Strategies

To create this kind of identity, this kind of a person, this kind of a vulnerable identity; the colonial discourse had its strategy both practical and theoretical: The theoretical strategy has a very long history in western intellectual traditions, which starts from the concept and essence of a human being and that is, the very idea of reason. So, the first thing that the theoretical discourses started from, was to define the target of colonization because they saw the colonized as lacking reason which, therefore, raises fundamental questions that have to do with the constitution of their humanity. And whether as Masolo puts it in chapter one of his book, in the first two paragraphs of his book on *African philosophy in search of an identity*,⁶ that according to the Europeans this very reason was very fundamental in not only defining our identity but also shaping our destiny. In other words, Masolo meant that by denying certain people targeted for colonization the ability to reason they are also denied the capacity to define themselves and shape their destinies.

That was not only the core but there is another element that is key to the colonial discourse about the so-called *otherness* or the targeted people; axiology⁷. That means there were defined in terms of esthetic and their moral capabilities. And again, the

⁵Alyward shorter WF, *African Culture And The Christian Church*.

⁶ This dialogue has taken many forms and has discussed a variety of topics and ideas depicting the individual's role and impact in the shaping and control of one's identity and destiny. At the center of this debate is the concept of reason, a value which is believed to stand as the great divide between the civilized and the uncivilized, the logical and the mystical. See D. A. Masolo, *African Philosophy in Search of Identity* Published in association with the International African Institute, (London: Indiana University Press, 1994), p.1

⁷ (from Greek *axios*, "worthy"; *logos*, "science"), also called Theory Of Value, the philosophical study of goodness, or [value](#), in the widest sense of these terms. Its significance lies (1) in the considerable expansion that it has given to the meaning of the term value and (2) in the unification that it has provided for the

targeted people were denied the capacity for moral sensibility and esthetic beauty. While ugliness has always been characterized in the colonial discourse the very essence of the targeted people to be colonized. Well, it is not as simple as many people may think about it. But you can see that even today our idea of beauty is always dictated and directed towards the colonizer's conceptions of beauty. Now, the moment you deny some people their moral you reduce their creations to the margins and Mudimbe reminds us that in the politic and powers of the discourse in the knowledge of otherness; knowledge is not as neutral as that, this is a "power game" and of course as a result of that the colonial discourses managed to marginalize these *other* identities and formations that why Africans are located at the margins of the extremes, they are outside the mainstreams of power.

This, therefore, is key in understanding again if we are thinking of the possibilities of decolonizing then we cannot just sit there and make noise and things will change, we must take therefore the politics of knowledge and the power of knowledge at the core in any process that we tend to put in place; the counter-claims as, "Fanon already believed that this imposed sense of inferiority could be exploded only by fighting back, by counter assertion,"⁸ by advancing some strong argument to deconstruct what we have been made to believe and this implies we must suit ourselves in the "power game of knowledge." Once this is initiated the imposed knowledge will be insecure of its existence and will be displaced. Threatened by this counter-knowledge, the newly introduced knowledge will move to extinguish, undervalue any critical thought, function, and actions of the imposed knowledge, in other words, the new knowledge will deny the authenticity and existence of the imposed knowledge, in so doing thus esteeming the indigenous, knowledge and identity by creating such critical knowledge systems hence, the authority of the indigenous knowledge becomes undisputed.

This discourse of colonization was to instill and inculcate the inferiority complex in the African mind. I must say the invention is not something new, we have been invented through various processes, through our religions, through cultural socialization, through political socialization and educational socialization, we are invented through these various processes and many others, only that the colonial process of invention Mudimbe

study of a variety of questions—economic, moral, aesthetic, and even logical—that had often been considered in relative isolation. The term "value" originally meant the worth of something, chiefly in the economic sense of exchange value, as in the work of the 18th-century political economist Adam Smith. A broad extension of the meaning of value to wider areas of philosophical interest occurred during the 19th century under the influence of a variety of thinkers and schools: the Neo-Kantians Rudolf Hermann Lotze and Albrecht Ritschl; Friedrich Nietzsche, author of a theory of the transvaluation of all values; Alexius Meinong and Christian von Ehrenfels; and [Eduard von Hartmann](#), philosopher of the unconscious, whose *Grundriss der Axiologie* (1909; "Outline of Axiology") first used the term in a title. See "axiology." [Encyclopedia Britannica](#). [Encyclopedia Britannica Ultimate Reference Suite](#). Chicago: Encyclopedia Britannica, 2014.

⁸ Frantz Fanon, David Caute, *Modern Master*, Edited by Frank Kermode, (New York: He Viking Press, 1970), 16.

is talking about was a denigrative process of invention. It was supposed to create the very negative opposite of the colonizers that the targeted group might suffer from inferiority complex and always be venerable for colonization and always be looking up for a colonizer as a guide and the rest. So that they can instruct them on how to live, believe, and behave so that they internalize these structures thereafter they can perpetuate that colonized mentality and so that they be stagnated in everything unless helped by them (Europeans). This is the doubtful way of how Europeans develop especially if such an inferiority complex is successfully established. This European social construct strategies of “holding” people back as they progress are noteworthy from Bell, she confidently writes:

Countering the notion of the natural superiority of whites, Baraka stated that whites excel because of “their ability to physically and mentally hold everybody else back while at the same time on many levels build, invent, and create for their own interest at the expense of others.”⁹

The Roots of Racial Discourses

This discourse you can trace it to the western discourses through some of the best great brains and the intellectual best brains the western world has ever produced. You can start as far as Plato in the *republic* talking about the types of souls where the purpose of education is just to test and scan them and see which one are golden; that nature made for leadership these are the philosophers they use their brains more because their muscles are very weak and they were made with the capacity to rule; and which ones nature made for the defense and security, like watchmen, police, and bouncers because they use their masculinity than their brains, their chests become the seat of their strength, they are the spirited souls; and which ones are of the appetitive parts, which is the dominant part for fulfilling the bodily desires. Plato argues that these major departments in the social structure of the world were created by nature for the specific duties, so education is made to isolate them.

Plato argues that nature had already set people differently for different purposes for the sake of peace, justice, and harmony. Plato was trying to find a philosophical justification of why some people remain in such and such situations depending on what nature made them for. This is Plato’s stratified society. Simplified as either your naturally born a slave or you are born to rule. By this Plato was laying down the foundation of the theoretic framework of racism from the point of natural distinction between people and this runs through his student Aristotle and Aristotle makes it very clear that people are born either destined to be colonized or colonize. Some are born naturally to be colonized. And he makes it very clear that if your color lies in the extremes like if your black as Africans then you’re naturally made for colonization. And if you’re as pale as white people then destined for colonization. Thus, according to Aristotle reason has a core relation with the skin complexion. He also argues that it is only right and proper that those who are made for colonization be colonized. It is right and proper for them. But key to this, Aristotle also believes that those who have these extreme colors like too black as Africans naturally lack the deliberative capacity, they

don’t have the capacity to reason. Most probably he meant that all black people and all women were born naturally as slaves and manual workers. There is a core relation in Aristotle’s theory between the color of the skin and the capacity to rule that why he saw women as light-skinned falling at the end and blacks’ skin color as too black, therefore, they are natural slaves. Only the white males are naturally endowed with reasoning capacity. Anybody who cannot reason is ill-suited for self-autonomy. They cannot be independent and they cannot be autonomous. Women and black people are ill-suited to be autonomous because they cannot make proper decisions left on their own, they need to be guided by somebody who has the natural capacity to reason.

This explains why Africa has allowed herself to be fooled by the European world because Africans still believe that the answer to their problems lies with the Europeans. And this also shows the degree with which an African has lost faith in himself, making them think that the purpose of their existence is to be subjugated by the Europeans. And in no way will the Europeans teach an African how to liberate himself because he enjoys and benefits from that supremacy and he will continue preaching to an African how good he is to him or her in their existence just to make them (African) thinks that he is not good enough and therefore he should be inseminated with white man’s thought and guidance to realize himself or herself.

In their imagination and thought (Europeans) they think that Africans lack deliberative faculty and can never attain the highest form of happiness as can be deduced from Aristotle. Speculative reasoning which Aristotle considered to be the highest form of happiness cannot be experienced by these people (Africans). The highest they can attain is being guided by those who have a natural capacity to reason. These are all discourses because by doing this they believe they were preparing these people to accept these constructs for domination and so that they can possess the psychological control of their identity for the formation of their personality.

Was there anything these people feared about the dark pigmentation of the black person, well the dark pigmentation of the black African skin has nothing to do with his deliberative faculty, in fact, Africans should be happy and proud of this because it is a “natural protection against the ultraviolet rays that are responsible for reddening and parching of the Caucasian skin. The African skin secretes abundant of oils for protection and the wooly hair form a good cap against the stewing sun,”¹⁰ as frankly observed by David Maillu. Africans who occupy the northern countries of Africa have lighter skin, owing in particular to generations of intermarriage with European and Arabs. The claim that ancient Egyptians, for examples are newcomers to Africa from the Middle East is baseless. This claim has been advanced by colonial powers in an effort to discredit the Blackman’s civilizations, which is said to be one of the earliest civilizations on earth. For the white man accept that the original Egyptians were

⁹ Bell Hooks, *Rock My Soul-Black People and Self-Esteem* (New York: Gloria Watkins, 2003) chapter six.

¹⁰ David G. Maillu, *African indigenous political ideology*, (Nairobi: Maillu publishing house, 1997), p.6

black would be dilute the theory that people with light skin have better brains than those with dark skins.¹¹

This construct was constructed with the idea of controlling the world, human behaviors, and human relations, and as they generate these ideas, some of these ideas end up in some kind of conflicts and they are generated with people who believe that human beings must behave in a particular manner. Then you find people like Thomas Jefferson who believe, "the blacks, whether originally a distinct race, or made distinct by time and circumstances, are inferior to the whites in the endowments both of body and mind."¹² And that's why they have never achieved anything praiseworthy, they have no civilization, none of them excels in science and artistic works, they can't create anything. And that inferiority complex even in them they feel it particularly in the presence of the white people the blacks feel inferior and they admire the Europeans in uniform, all of them admire the Europeans. This admiration is positive or negative in one way or another in the negative tangent it is the cause of retrogressive development in Africa because it has inconvenienced and denied Africans many opportunities for development. After all, naturally, they feel anxious to admire, and if possible, have everything the Europeans have or are ready to give them whether harmful to them or not. For instance, if the Whiteman declares that In Vitro Fertilization (IVF), is the best method of human production **other** than the natural one the Africans will follow that without thinking about it. Africans must change their perceptions if they want liberation to develop and love who they are and what they have before they love others and what they have for them, they should inculcate in their DNA the philosophy of *being and having* not *having and being*, there is danger in the opposite end when someone loves you more than you love yourself. On the positive tangent, it helps in the promotion of development through absorbing the positive thing from the European world and apply them to themselves for their own growth and development without force.

They admire their color, hair, bodies etcetera, these are hegemonic relationships fueled by people like Jefferson. So, this informs us that it is power relations that determine how culture becomes adopted as a way of life so Africans should not assume that our cultures are inferior. The Europeans managed to project their culture as superior to the world through construct formation so also Africans can.

The Impact of Western Social construct: The Root Course of Cultural Intoxication in Africa

¹¹ David G. Maillu, *African indigenous political ideology*, p.6-7.

¹² Ngugi Wa Thiong'o, *Writers in Politics Essays* (London: Heinemann Educational Books Ltd, 1981).

¹³ The results of being dominated culturally your values and norms are deprived Fanon tell us "When you make men slaves you deprive them of half their virtue, you set them set them in your own conduct an example of fraud, rapine and cruelty . . . and yet you complain that they are not honest or faithful!" see Frantz Fanon, David Caute, *Modern Master*, 16.

¹⁴ Hegel advanced the view that Africa "is no history part of the world; it has no movement or development to exhibit" Hume

When you are dominated culturally that is economically, socially, politically and even educationally you tend to admire things from the dominant world and this breeds dependency in conjunction with other threats that it brings to the society. Culture is a shadow of realities but when the power game relations get in between two cultures then it is the dominant power that defines what culture one will look up to. Culture is not a stand-alone thing; cultures accumulate and form itself around human activities and once it forms itself it is nothing else other than a reflection of activities and practices that have accumulated around those human activities and their functions. It is their worldview and aesthetic view of their community embedded with peoples' perception of developments, religious faith inter alia. So, when you are dominated you lose the cultural functionalities of your cultural practices, and even to some miles, you become dependent on your own cultural development¹³. And this explains why Africa is behind because it has been consigned to the dependency role, this is because it has been subordinated by the interests of the European in the areas of trade and the area of manufacturing among others. And this expels the claims that Africa has been backward because it's divinely created as some western anthropologists would claim but it was a function of trade relations; it was a function of world economic zones to exploits Africa and not that Africa was destined by the divine to be liberated by the Europeans neither does it arise from the weaknesses of Africans e.g. weakness in intellect or lack of capacity to think about what is good for them. Seriously, there is a need to understand the centrality of these racial discourses in the history of both African culture and nationalism struggles because they are both extensively assumed and frequently overlooked.

And these discourses of lack of capacity to think can be traced from Hegel¹⁴ Kant, levy Bruhl, Trollope, Hegel, Trevor Roper, and all other arch-priests of privilege, racism and class snobbery.¹⁵ Consequently, it has not stopped; it an ongoing discourse. But, were they stupid in trying to understand the nature and meaning of human knowledge? And were they limited in their knowledge? They were not either. Generally speaking, these people were engaged in a whole history of forming certain character which Mudimbe said in the first page the last paragraph of his book was meant (racism discourses) to create a western construct; to construct other races into some of the kind of identity the western world want an identity which will be easier to colonize and control. A self that has been made to accept the western rule as divinely ordained because they have a moral obligation to rule and uplift the lives of these people who are naturally have been placed by the law of the hierarchy at the extremes. Emmanuel

even goes father saying, "I am apt to suspect the Negroes to be naturally inferior to the whites. There scarcely ever was a civilized nation of that complexion, nor even any individual eminent in action or speculation. No ingenious manufacturers amongst them, no arts, no sciences. On the other hand, the most rude and barbarous of the whites, - such as the ancient GERMANS, the present TARTARS, have still something eminent' about them ... Such a uniform and constant difference could not happen if nature had not made original distinction betwixt these breeds of men, see Emmanuel Chukwudi Eze, *Postcolonial African philosophy: a critical reader* (Cambridge: Blackwell Publishers Ltd, 1997), 7.

¹⁵ Ngugi Wa Thiong'o, *Writers in Politics Essays*, 19.

Chukwudi observed how the western anthropologists tried to justify themselves and he critiqued them saying:

It is for good reasons then that "the critique of Eurocentrism¹⁶" has become a significant, if "negative," moment in the practice of African philosophy. For it is with the authorities of Hume, Kant, Hegel, and Marx behind them, and with the enduring image of "the African" as "black," "savage," "primitive," and so forth, in conjunction with clearly articulated political and economic colonial interests, that nineteenth- and twentieth-century European anthropologists descended upon Africa. And *Quelle surprise!*: the Levy-Bruhls and the Evans-Pritchards report that the "African mind" is "prelogical," "mystical," and "irrational;" or, when it is recognized as "logical" (such as by Evans-Pritchard), it is still compared and considered "inferior" to the "Western" scientific mind as if all Westerner's' minds are scientific, or as if all Africans must have the scientist's mind to be rationally human. These anthropological productions, often commissioned after the military invasion of an African territory or after a rebellion against occupying European powers, were intended to provide the European administrations and missionary-cultural workers with information about the "primitive" both to guarantee efficient administration and to provide knowledge of the "African mentality," so that, while demonizing and repressing African practices, the "superior" European values and attitudes could be effectively inculcated into the African conscience.¹⁷

Why do I go through all these? If we are going to look at the possibilities of decolonization then we must also be prepared that this is supposed to be a long process that is going to be initiated and not ending so quickly. This effort to displace the dominant Eurocentric notions or voices on Africans by perpetuating their denotative character of supremacy and imperialistic status to distinguish them from other races must be muzzled as Oruka put it that there is need to, "critique and displace the absolutist metaphysics and epistemology which are thought to identify and provide knowledge of a rational order of axiom,"¹⁸ but it sad to inform you that some African scholars these days spend their substantial time in being preoccupied with demystifying these racial constructs instead of concentrating on positive scholarship that will transform Africa in all its problem scopes neither are they engaged in Oruka's request a few of them do the opposite.

Decolonizing the Western Construct: Suggested Solutions

If we move from that theoretic discourse, looking at page two of Mudimbe's works, he talks of some practical strategies the Europeans used to dominate and exploit Africa, the procedures of acquiring, distributing, and exploiting lands in colonies; the policies of domesticating natives; and the manner of managing

ancient organizations and implementing new modes of production,¹⁹ in regards to this he explained more profoundly how the Europeans used these processes on Africans, the first step was to occupy a space, the physical space to rearrange the physical organization systems and social organizations. They had to do physical rearrangement for the colonial structures to be implemented. b) The second thing that Mudimbe is talking about is domesticating the native mind. The African minds had to be domesticated and be injected with certain ways of values, a certain way of thinking, and certain cognitive perspectives so that they start thinking in European perspectives, seeing and behaving in European manner and worship in European manner for the implementation and execution of imperial way of life. c) The third practical thing that Mudimbe talks about is the appropriation and integration of the economic histories of Africa into western perspectives:

Thus, three complementary hypotheses and actions emerge the domination of physical space, the reformation of natives' minds, and the integration of local economic histories into the Western perspective.²⁰

The sad thing is that if I look at Africa today, that as much as colonial discourse invented this kind of a person who cannot think of himself or herself and who therefore should look for the colonizer for a guide, initially this was an imposition but am sad to say that as things are today virtually across Africa, African governments have called for foreigners to come and recolonize us, why to say this, look at the rush and heavy borrowing from China, why is that happening and how are these governments going to pay these sums of money, remember I said, the main objective of colonization was economic exploitations which is still ongoing and started with slavery period but now we are inviting them to come to exploit our resources and enslave us economically.

The instantaneous increase of China's economic and political involvement in Africa not out of goodwill for the developmental and thriving economic purposes of the continent. It is on economic exploitation in a neocolonial manner. China currently is Africa's largest trading beau and the biggest economic investor. Furthermore, it is the fastest and rapidly growing economy and source of foreign direct investment. All these rapid growth and investments of the Chinese economy basically come from Africa that is languishing in poverty. China is slowly gaining control over African resources by promising African leaders' "instant" economic growth, African leaders need to be reminded that economic growth is a process and not an event, but Chinese are soon succeeding in convincing them that it is an event.

How long are we going to control our resources since beggars cannot claim to be free? So long as one is enjoying a situation of begging finally, he or she is going to be enslaved.

¹⁶ Eurocentrism revolves around the notion that Western values and ideals are closest to objective truth, and they should therefore be made the yardstick to measure rationality, truth, reality and civilization in other non-Western parts of the world. This mindset played a large role in fueling imperialism during the colonial era and has continued to sustain neocolonialism long after imperialism has ended. See Isaac E. Ukpokolo, *Themes, Issues and Problems in African Philosophy* (Switzerland: Palgrave Macmillan imprint is published by Springer Nature 2017), 150

¹⁷ Emmanuel Chukwudi Eze, *Postcolonial African philosophy: a critical reader*, 10.

¹⁸ Cf. H. Odera Oruka, *Sage Philosophy: Indigenous Thinkers and Modern Debate on African Philosophy* (Nairobi: ACTS Press, 1991). p.216.

¹⁹ V.Y. Mudimbe, *The Invention of Africa* Gnosis, Philosophy, and the Order of Knowledge, p.15.

²⁰ V.Y. Mudimbe, *The Invention of Africa* Gnosis, Philosophy, and the Order of Knowledge, p.15

African leaders must wake up, they have become what Fanon calls the “national bourgeoisie,” “Africa’s leaders bear some responsibility to the continent’s crisis. Aided and abetted by the West, Africa’s demoralized and cynical leadership has completely failed its citizens. In a report to the U.N. Security Council in 1998, Secretary-General Kofi Annan noted that it was time for Africans to hold their political leaders responsible for the economic failures that ravage their lives. “Where there is insufficient accountability of leaders, lack of transparency in regimes, inadequate checks and balances, non-adherence to the rule of law, absence of peaceful means to change or replace the leadership, or lack of respect for human rights, political control becomes excessively important and the stakes become dangerously high.”²¹ African leaders have become “hyenas” of their own countries. Leadership in Africa is like an opportunity to plunder people’s wealth, this is not in all African countries but virtually in most African countries their leaders plunder their own wealth. They are opportunistic and materially possessed leaders claiming to be leaders of Africa but they have defiled the integrity of their own people and constitutions that is supposed to guide them and continues to enjoy the top cream at the expense of vulnerable starving citizens.

The Attempts of Decolonization and Why They Failed

Now, were there attempts to decolonize this colonial discourse, the answer is yes, *Negritude*²² by Senghor was one of the attempts to at least asserts Africanism among so many other philosophies and slogans like *humanism* of Kaunda that promoted the philosophy mutual, comprehensive and inclusive society of traditional Africa, *Ujamaism* was another attempt by Nyerere where people live and share the community’s wealth communally, the emphasis is based on the value of human community. Other attempts were *Africanism*, philosophical *consciencism* etcetera. Now, these were some of the attempts by the African leaders that highlighted the African ideologies that would deconstruct the western psychological myth of superiority through reviving the African values suppressed by eurocentrism. But they all failed because of the strong economic forces of capitalists that were skyrocketing at that time. The dawn for independence challenged them (African leaders) to debacle since one had to go east or west.

And remember at independence, there was a lot of attempts to break away from colonial social systems and institutions but as things are right now nobody is talking about different ideology from the colonial ideologies, so are we back in perpetuating structures and colonial discourses? Yes, because we have never understood that our minds have been domesticated and the interesting thing with imperialism is that once it is successful, once the mind is colonized, it has a propensity to reproduce itself and we don’t need the physical imposition and presence of the colonizers to tell us to do this and or that, we now do it ourselves,

²¹ Wisdom J. Tettey, Korbla P. Pupilampu And Bruce J. Berman, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, (Netherlands: The Koninklijke Brill Nv, Leiden, 2003), 362.

²² For instance, Senghor, writing in 1964, describes *negritude* as the collective personality of the black African. More precisely, *negritude* is the “ensemble of the cultural values of the black world, as these express themselves in the life, the institutions and the works of black people” Race circumscribes the area within

it automatically infuse itself, because we have already internalized the mannerisms that depict imperial culture; in other words, the Europeans left but we are the “Europeans” left behind who replaced them because of our mannerisms.

At independence, the colonial experiences taught Africans to fight for his or her essence and existence so that he can have control of his or her own identity and destiny. That awareness that one has to fight for his or her identity was well and clear in the African mind, this was marked by bloody struggles for liberation and it took many Africans sundry of years to have confidence that being Christianized and speaking European dialects could not give liberation and they had to invent an unpolished way to muzzle them out and get independence until now nobody could account for the Africans that were maimed and sort dead by the gun in the process nonetheless it is in their spirit for the liberation that they made such hazardous decisions and today we remember them, “We must remember the many slave rebellions in which our forefathers took part, arose despite severe persecutions, wholesale killings and the treachery of stool pigeons in the ranks... If we honor the fighting traditions of our forefathers, if we claim the right to be their true sons and daughters, positively we must follow in their footsteps of struggle and not disgrace their heroic struggles and trample in cowardly passivity the courageous and fighting heritage that they have passed on to us,”²³ we should be grateful to our slaved ancestors, not embarrass them, in their so-called prelogical state they realized and refused to conform to the “truths” constructed as a result of power relations and in their act of resistance they triumphed.

These others attempt to decolonize Africa; the colonial discourses to reinvent Africa apparently did not have some philosophical principles that could sustain them. And they vanished appallingly. If we need really to decolonize and reinvent Africa and go beyond invented Africa then we must seriously rethink of the power game around the concept of knowledge and know that knowledge is a contested line of discourse and if there are more contending powerful knowledge systems then our systems are likely to be marginalized. We need to have a clear political ideology and policy and means of implementing them and it must be based on some philosophical principles which can sustain a discourse. When I hear some scholars arguing that *ujamaa* died with Nyerere because they claim it was Nyerere who was *Ujamaaist*, such discourses are dangerous. We need principles about the conception of what we want to become. Do Africans know really what they want to become other than what they were created to be? Africans need to know who they are and what they want.

What Should We Do? The Desire for Antithesis Discourses

which are to be found common beliefs and values. See Tomaz Carlos Flores Jacques, *Discursos Postcoloniales Entorno A África*, (Al Akhawayn University, 2010)

²³Cathy Bergin, *Bitter with the Past but Sweet with the Dream’: Communism in the African American Imaginary, representations of the Communist Party, 1940–1952* (Netherlands: Koninklijke Brill, 2015) p.64. Also see the link of the book on www.brill.com/brill-typeface.

In the history of philosophy, it is evident nearly with all the philosophers that when one constructs a theory explaining some phenomenon or certain natural fact or societal social problem then it will be within no time before its antithesis acutely opposite to that theory is formulated inquiring about its assumptions, that why in philosophy we don't have any dominant school of thought, that is what we need about these European constructs, they have been dominating because we have not offered a serious discourse to suppress them.

So basically, all these discourses were meant to create particularly to the Africans to feel that indeed they are naturally inferior and therefore accept domination and look like an inferior self who would always look to the white man for salvation and guidance and that could allow for colonization or neo-colonialism which are basically for their benefit (Europeans). The lesson we learn from the nature and purpose of these discourses was to make Africans psychologically inferior which the Europeans succeeded in doing perfectly but the problem we are now facing is unless we understand the nature of these discourses, we can never deconstruct them. Because we need to deconstruct these discourses, we need to start another powerful discourse of liberation, discourses that will elevate us and make us more autonomous and prouder of ourselves and more independent.

Education as the Key factor to Self-autonomy

Such path of forming a parallel argument of autonomy-regain of the self can be analogously understood when reading Paulo Freire in the *Pedagogy of the Oppressed*, a very classical book, Paulo believes that the education system of the colonizers is not suitable for the colonized, the education system by the colonizer was supposed to create the colonized a subject, it is the education of a slave, so colonized countries must now device their own education that will lift the oppressed from their servitude position and the colonized seems to have failed in that. Paulo frankly remarked:

The central problem is this: How can the oppressed, as divided, unauthentic beings, participate in developing the pedagogy of their liberation? Only as they discover themselves to be "hosts" of the oppressor can they contribute to the midwifery of their liberating pedagogy? As long as they live in the duality in which *to be is to be like*, and *to be like is to be like the oppressor*, this contribution is impossible. The pedagogy of the oppressed is an instrument for their critical discovery that both they and their oppressors are manifestations of dehumanization.²⁴

The system of education as per now in the colonized countries are not founded on their values and needs and therefore, it is futile to them Dr. Carter G. Woodson reminds us that:

The so-called modern education, with all its defects, however, does others so much more good than it does the Negro, because it has been worked out in conformity to the needs of those who have enslaved and oppressed weaker peoples. For example, the philosophy and ethics resulting from our educational system have justified slavery, peonage, segregation, and lynching. The

oppressor has the right to exploit, to handicap, and to kill the oppressed. Negroes daily educated in the tenets of such a religion of the strong have accepted the status of the weak as divinely ordained, the Negro's mind has been brought under the control of his oppressor. The same educational process which inspires and stimulates the oppressor with the thought that he is everything and has accomplished everything worthwhile depresses and crushes at the 'same time the spark of genius in the Negro by malting him feel that his race does not amount to much and never will measure up to the standards of other peoples. The Negro thus educated is a hopeless liability of the race. The difficulty is that the "educated Negro" is compelled to live and move among his own people whom he has been taught to despise. As a rule, therefore, the "educated Negro" prefers to buy his food from a white grocer because he has been taught that the Negro is not clean. It does not matter how often & Negro washes his hands, then, he cannot clean them, and it does not matter how often a white man uses his hands he cannot soil them. The educated Negro, moreover, is disinclined to take part in Negro business, because he has been taught in economics that Negroes cannot operate in this particular sphere.²⁵

So, we need to start a whole parallel discourse of autonomy and independence to deconstruct Eurocentrism superiority complex discourses by going back to learn our history and know where are the pitfalls and where did the rain start beating us so that we may be conscious of them. Am not saying that we move back to square one to African outmoded practices that would be dreary and virtually impossible because no nation lives in the past but to move ahead steadily we need the past to understand the present and figure out the future if it is in our sanguinity to create the Africa we hope for and want then we need to know and understand where we came from, it's crucial in any developing nation otherwise pre-colonial African civilizations were advanced in their own right but that aspect of historical continuity with the African past is so much essential for her commitment to the renaissance of her values. Through and by history man is the product of his history.

So, if Africans want to be independent, they must know how their servitude identity was formed first because how can one unformed them yet they don't know how it was formed. Nobody grants one power you must earn your power since who does not enjoy power and control of others? We need to learn to know how we came to be where we are then we must alter that process by forming an opposite process to liberate ourselves because liberation is also a process. Paulo put it very crystal-clear that liberation is, "not a gift, not a self-achievement, but a mutual process."²⁶ Africans must be reminded to know that, "none was born superior to everybody" and the miser is exploited when he or she is in good spirits as African proverbs may confirm.

Autonomy and Independence

Accordingly, the African up to now have mastered the master and its high time he breakthrough and be unrestricted from

²⁴ Freire, Paulo; Bergman Ramos, Myra, *Pedagogy of The Oppressed*, (New York London: Bloomsbury, 2014) chapter one

²⁵ Khalif Khalifah H., *Mis-Education of the Negro in Proper Prospective (Braham's Hill Road - Deweyville, Virginia;*

Khalifah's Booksellers & Associates, 2005. See also the book link at www.khabooks.com

²⁶ Freire, Paulo; Bergman Ramos, Myra, *Pedagogy of The Oppressed*, (New York London: Bloomsbury, 2014), chapter 1 and 2 discusses this more deeply.

his or her filched autonomy and this would necessitate them to deconstruct this image constructed by its engineers and swap it with his self-rule and responsibility. Autonomy is attained by subjugation; it is not given on a silver platter once snatched, it must be hunted continuously and sensibly. Autonomy is not something ideal situated in the world of forms exterior of man as Plato would tell us but then again it is rather the requisite condition for the expedition of human whole freedom. But are Africans ready for this great revolution? The reason why this liberation for Africans will delay is that some of them are submerged in the system of the oppressor the so-called white-African is not ready to be liberated but the few who are fighting for this relief are also fought by the white-African, Paulo illustrates this more succinctly:

However, the oppressed, who have adapted to the structure of domination in which they are immersed, and have become resigned to it, are inhibited from waging the struggle for freedom so long as they feel incapable of running the risks it requires. Moreover, their struggle for freedom threatens not only the oppressor but also their oppressed comrades who are fearful of still greater repression. When they discover within themselves the yearning to be free, they perceive that this yearning can be transformed into reality only when the same yearning is aroused in their comrades. But while dominated by the fear of freedom they refuse to appeal to others or to listen to the appeals of others, or even to the appeals of their own conscience. They prefer gregariousness to authentic comradeship; they prefer the security of conformity with their state of unfreedom to the creative communion produced by freedom and even the very pursuit of freedom.²⁷

In the case of African situation, this conformism Paulo is talking about is seen in Ngugi's work when he said, "It is the African ruling classes, once described by Fanon as having a permanent wish for identification with the bourgeois representatives of the mother country, who under neocolonialism become the missionary agency for the continuation of cultural imperialism as part and parcel of imperialism's economic and political encirclement of the world,"²⁸ close to that Nyerere, also put this more agreeably, "In practice, colonialism, with its implications of racial superiority, was replaced by a combination of neocolonialism and government by local elites who too often had learned to despise their own African traditions and the mass of the people who worked on the land."²⁹ So despite our fight for liberation from imperialism some of us are stumbling block to this success they are what Ajayi *et al* described as, "Some educated Africans cooperated with this European desire in the belief that colonial rule might prove a necessary step to African development *but* Colonial rule proved to be both an opportunity and an obstacle to African development."³⁰ Bell has good counsel for such

individuals who are driving Africans in a retrogressive manner, that there is a big risk:

If we, as a people, are so busy trying to be white, trying to love white, trying to act and live white in a world that will only accept us if we are actually white—we should be in the position that we're in. To want to be white in a world where the majority of the people are of color is a sickness. To have internalized the values and aspirations of the oppressor to such a degree again emphasizes the need of a people to educate its own if it wishes to keep its own. To turn our children over to others is to run the risk of losing them forever.³¹

Such mindset, in my assessment, really perpetuates not only colonial mentality but also neocolonial mentality in stubbornly seeing Africans as primitives, and again they see Africa as a vast dark continent, they are not objective and universal in their approach to Africa(ns). This clearly shows how neocolonialism remains an impediment to true sovereignty and autonomy, therefore, is sources of African current problems today.

Liberation by History and literature

We return now to the analogy of language as a memory bank of the peoples' practices. Language is significant in the discourse, dialogues, and understanding of societies, it is the vehicle that drives the society, the social practices, morals and generally the traditions are stored in the language hence when a society loses its language completely it may result in the loss of its traditions as well. Kenyan writer Ngugi wa Thiong'o argues that the issues of language in Africa must be understood within the context of European domination, marginalization, and exploitation. The politics of language is deeply intertwined with the cultural imperialism represented by Eurocentric domination of Africans and this was done in a process of destruction or the deliberate undervaluing of a people's culture, their art, dances, religions, history, geography, education, orature and literature, and the conscious elevation of the language of the colonizer. The domination of a people's language by the language of the colonizing nations was crucial to the domination of the mental universe of the colonized.³²

The struggle for cultural freedoms is thus the struggle to resist continued domination in any sphere. African languages must be enlisted as part of the discourses and narratives in delegitimizing colonialism. One way to demonstrate the contention that Africans have always had a philosophical tradition is to revive the local languages in ways that free cultural production and expression. Language is the people's collective voice, and African languages become inescapably contested terrains in the battle to either deny or establish cultural identity.³³

To surmount the situation of oppression and domination, people must first critically recognize its cause, so that through

²⁷ Freire, Paulo; Bergman Ramos, Myra, *Pedagogy of The Oppressed*, chapter one.

²⁸ Ngugi Wa Thiong'o, *Writers in Politics Essays*, p.,25.

²⁹ George B. N. Ayittey, *Africa Unchained the Blueprint for Africa's Future*, 9.

³⁰ Ajayi, J. F. Ade.; Goma, L. K. H.; Johnson, Ampah G, *The African Experience with Higher Education* (Ohio: Ohio University Press, 1996), 25.

³¹ Bell Hooks, *Rock My Soul-Black People and Self-Esteem*, chapter six

³² Imbo, Samuel Oluoch, *An Introduction to African Philosophy*, 1998.

³³ Imbo, Samuel Oluoch, *An Introduction to African Philosophy* (Boston Way, Lanham, Maryland: Rowman & Littlefield Publishers,1998)

transforming action they can create a new situation, one which makes possible the pursuit of a fuller humanity.³⁴ And this demands that as African scholars we must be good readers of our history and be good interpreters of those historical contexts, then we shall devise a good counter-argument to these snags, we must read in between those works about Africa/Africans published by foreigners alongside interpreting African idioms, songs, folktales and proverbs along others to elicit the great knowledge behind them. Most African intellectuals especially the critics have enormously failed to interpret the above-itemized materials and they have left that role to the western scholars, it is notable from Ngugi who laments that "Ignorant of their country, some people can only relate tales of ancient Greece and other foreign lands,"³⁵ that should desist as he urged them in some other text: We must also reject the erroneous attempts of foreign students and *local scholars* to interpret and present her (Africa). We must interpret and present Africa in our own way, *in our own understanding*, and our own interest.³⁶

Proverbs for instance as a component of an African culture that carries with it the community piquancy of thoughts or philosophy in social, ethical, politics, economics, and religious aspects of life. Ngugi reminds us of the importance of literature in our process of becoming and self-realization saying:

At the same time, literature is more than just a mechanistic reflection of social reality. As part of man's artistic activities, it is in itself part of man's self-realization as a result of his wrestling with nature; it is, if you like, itself a symbol of man's creativity, of man's historical process of being and becoming. It is also an enjoyable end-product of man's artistic labor. But more important, it does shape our attitudes to life, to the daily struggle with nature, the daily struggles within a community, and the daily struggle within our souls and selves.³⁷

Language reflects a people's cosmology and their perspectives on reality, conveying cultural beliefs. Imposing a language on society is a form of cultural imperialism because language conveys important understandings about the way its speakers live, feel, and think indeed, how they define themselves.³⁸ It is significant in promoting African languages in the rehabilitation of their colonial destruction, to relink once again with the way of life and the ideologies that they contain within them.

That is how literature has a very pregnant ingredients in our understanding of any historical context and content of any people, I call for this action particularly in the interpretation of African literature because as we speak now few African intellectuals have taken the initiative in the dissemination of their

views on Africans. And as we speak now a good number of the works about African issues some of which still troubling us were written by European anthropologists, general spectators, colonial superintendents, and religion proselytizers, apparently, they observed at the African situation with a certain notch of partiality henceforth making a good number of predisposed judgments on Africans. This is very evident and it is interesting to see how common their conclusions were regarding African social structure, economic structure, or political structural or any of the issues one was handling about Africans.

They took these prejudices to give support to their social structures demonizing the social structures of traditional indigenous African systems. They never did a research of what was common among their system and that of traditional Africans and if they were, to what extend was that variance, I thought this could have earned them a lot of veracity. This showed that they had no history about traditional African indigenous people and they were just making their undesirable assumptions, and this not just those western scholars, it is also a problem among the Africans scholars particular the criticizers who based their evidence on the short history of African cultural practices they have gathered rather than doing intricate research coupled with interpretations. For instance, there has been a biased conclusion as we have seen that Africans generally are inferior and having a low level of deliberative faculty, the western did not tell us the history of that except appealing to nature as the isolating apparatus of that inferiority and superiority complex. Everything has a historical context so also should be rationality debate on Africans, they failed to show this historical evidence maybe because their preconceptions were grounded on how they sluggishly understand how African were fine-tuning to the demands of the contemporary social ladder.

Nonappearance of an in-print and documented history of Africans has often been the pivotal point of rationalizing the desolation of African history, granting that it has never been always denied the fact that the African whether in a primitive state or civilized mode had always lived in Africa since time immemorial. And we all know that no nation or people could live in this world and create no history. Even in the barbarian state of life as the Europeans present the Africans who, they thought to be so; Africans could never have existed deprived of history. So, unless we understand that history then we can devise divisionary tactics of parallel augments based on some philosophies to deconstruct the myth of the European preeminence. Otherwise, it would be enormously hard for Africans to divorce themselves from the primitiveness nature that the Europeans have always associated them with. "Finally, the notion that "Africans belong to a sick or unregenerate culture is a racist assault on African and

granted. This ABC of education is followed in most societies because it is demanded by the practice and the experience of living and growing."

³⁶ Prof. Okot P' Bitek, *African cultural revolution*, introduction, (Macmillan books for Africa,1973). The italics are my own emphasis.

³⁷ Ngugi Wa Thiong'o, *Writers in Politics Essay*, Part I.

³⁸ Imbo, Samuel Oluoch, *An Introduction to African Philosophy* (Boston Way, Lanham, Maryland: Rowman & Littlefield Publishers,1998).

³⁴ Freire, Paulo; Bergman Ramos, Myra, *Pedagogy of The Oppressed*, chapter one paragraph 11.

³⁵ Ngugi Wa Thiong'o, *Writers In Politics Essays* (London: Heinemann Educational Books Ltd,1981), Part I. in this text, Ngugi give an illustration on the important of literature and history saying "A Russian child grows under the influence of his native imaginative literature: a Chinese, a Frenchman, a German or an Englishman first imbibes his national literature before attempting to take in other worlds. That the central taproot of his cultural nourishment should lie deep in his native soil is taken for

Black peoples all over the world. Indeed, the stereotypical image of Africa as a “dark continent ravaged by famine and slaughter” is widespread. Africa has become the joke of the world.”³⁹

Africanizing the System through Education

Each one of the Africans must comprehend the “system” of the oppressor from a historical curvature and work for its coup not militarily but through turning back on African values and see how reciprocally those values could be fused with western values for better development and the reshaping of the western system of education based on Africans values, this undertaking must, by all means, take lead since this is where I believe the rain seriously started beating us from. There is a strong need to promote African indigenous practices by creating a paradigm of a shift to African values and their ideologies so that they move from the crisis of values and this can be done with a high level of intelligence and sense of accountability, to effectively deconstruct everything, Africans must be in charge of their destiny.

They need their own system of education projected towards their needs to effectually help in retorting the African problems, they should instantaneously walk away from the effectively brainwashed culture and move away from the European cultural heritage and come to the rich cultural heritage of the African people. The kind of education that is supported by the African needs and benefits is based on their tradition of how they perceive their problems that surrounds them and will give them ways on how they can walk away from such a crisis. At the moment the kind of education the Africans are undergoing can be described like a tree planted on the tin since it's unsubstantiated on her various customs and traditions, this is because, “education should be adapted to the mentality, aptitudes, occupations, and traditions of the various peoples, conserving as far as possible all sound and healthy elements in the fabric of their social life; adapting them where necessary to changed circumstances and progressive ideas as an agent of natural growth and evolution.”⁴⁰

Education should primarily be based on peoples’ cultural settings as the software or that vehicle that carries an individual’s beliefs, behavior, values, and generally the worldviews, such education enhances one’s attitude, which stimulates him or her to be more productive to the society. In this manner any critical educationalist would work for closer links between the ‘school curriculum’ and social environments, relating the teaching of science and technology to local situations. When the African educationalist succeeds in this implementation then it will be the definite way to the inversion of colonial rule in Africa. “More importantly, Kofi’s narrative attests to the power of indigenous knowledge to not only subvert cultural domination by western culture and technology but also the potential of developing alternative local economies through the application of indigenous science and adaptation of other sciences to local needs.”⁴¹ Critical teaching based on the cultural context (African) will affirm rather than devalue local

knowledge. Critical education for awareness is essential if we are to change and sustain our cultural content and context for self-identity.

Otherwise, things will continue to fall apart, and “the center will not hold,” no more as we are being reminded by a renowned and popular African scholar Chinua. The underlining issue here that the masters by all means possible have controlled the African cultural setting ranging from education, their religious worldviews, literature and language and all strong components of their cultural settings that express their essence and existence this has enabled them to have control over their values and eventually their creation outlook have been neutralized and paralyzed. Again, we are not dismissing western system of education as impractical for Africans but it needs to be seriously intermingled with the African traditions to effectively solve her problems because most of the African systems be it in popular religions, education, politics, economics or any social systems deal with western structures and problems, otherwise, as things as per now they are causing more harm than good here is a testimony from Wane, a young Kenyan scholar, relates her personal experience, representative of a very common phenomenon on the continent of Africa as brought about by holding the Western form of education in high esteem. In her own words she attests:⁴²

The education that I received reinforced very strong Western values and created a desire in me to aspire physically to relocate and live in the West. I truly felt that education would be incomplete if I did not visit the land and see the people who dominated so much of the ethos of education in Kenya. This was because all the learning was embedded in a social structure designed to erode traditional knowledge and values. Most learnings concentrated on Europe and North America. Colonial education succeeded in planting seeds for the expansion, growth, and sustainability of imperialism.⁴³

Our education systems as they now are just primary tools that Europeans are using to champion their colonial mentality because they still have control over them and they are always ready to fund them through scholarship among many other ways to just make sure that they continue miseducating Africans. So, without a thoughtful continuing educational reform by African leaders and scholars then education will remain reflecting the colonial culture where our students will continue to get those forms of information that make them think and justifies their enslavement. So, if Africans want to be unrestricted then they must be educated on those educational systems that will make them liberated because without intellectual freedom surely there cannot be true and perpetual freedom as in the case of Wane. Education in its practical nature is for liberation and obtaining freedom from various problems we experience and if it is not critical and creative to the consciousness of the learner then it's enslaving especially to the culture that dominates as its reward, that is conformity which

³⁹ Wisdom J. *et al.*, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, 3612.

⁴⁰ Ajayi, J. *et al*, *The African Experience with Higher Education*, 43.

⁴¹ Wisdom J. Tettey, Korbla P. Puplampu And Bruce J. Berman, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, 382.

⁴² Isaac E. Ukpokolo, *Themes, Issues and Problems in African Philosophy*, 150.

⁴³ Isaac E. Ukpokolo, *Themes, Issues and Problems in African Philosophy*, 150.

should not be the case, education ought to fortify our thinking capacity so that one be completely self-actualized, objective and psychologically integrated into his or her worldview.

In any case, education is developed and designed by tradition and those traditions are shaped by some factors which provide guidance and direction, so, traditions cannot be transplanted or be imposed without some synergetic relations that are of benefit. Let us not mingle things, "The truth is that the content of our syllabi, the approach to and presentation of the literature, the persons and the machinery for determining the choice of texts and their interpretation, were all an integral part of imperialism in its classical colonial phase, and they are today an integral part of the same imperialism but now in its neo-colonial phase."⁴⁴

Far from that our main question which concerns us here is whether these so-called western "educated" African persons are essentially equipped to confront the tribulation before them or they insentiently contribute to their own ruination by disseminating the regime of the colonizer. It has been a wrong believe that education of the Europeans to Africans should mean the same thing to the two parties but, today I tell them that they are two dissimilar things to both of them. Anybody who wants to bring the element and the politics of race around this reality should be erroneous, surely, the component of race has no room to fit here. Africans needs a kind of education that emerges within their cultural context but if they are to borrow other systems because societies through their interactions with other societies changes then Africans before borrowing such contents needs to exercise their common sense in approaching their culture and people with such contents through understanding their environmental context to deal with such environmental circumstances and conditions as they present themselves not as they see and imagine them. To the critics of my position, I am aware of the fact that western-educated Africans normally with a criticizing mind criticize people who promote the education of Africans based on their environment settings that are different from that given to them by the Europeans as an erroneous stand, I implore them to deeply reflect about my stand.

Education emerges in a society it is serving and the society sets and determines the goals to be served by that education system depending with its demands so, one cannot pluck American or Chinese system of education and transplant in Sudan or Ethiopia or Kenya hoping that it will succeed in serving their needs no, you need to be cognizant of what extend your borrowing considering those recipient societies' environment as the key factors and if possible they should develop and carry out a program of their own. I agree that change occurs when two cultures meet together and influence each other like Africa has been influenced by the western technological system like in machinery and transport systems etcetera that is making Africa adopting the western technology systems rapidly but the adoption process is cutting and pasting, if such adoption could be made considering the compatibility, environment and the needs of the Africans then they would of greater use by Africa(ns). The adoptions of such cultures unconsciously like in technology bring other cultural changes within the African cultures that affect her cultural ideals. For instance, technology in terms of socialization has affected

negatively the African way of the relationship that is promoting individuality among Africans replacing the communal aspect of Africans.

It is extremely important to initiate this process of Africanization so that Africans may appreciate their home-grown knowledge so that they don't appear and feel like they are *inferiorized* that anything native, indigenous, local, or African is substandard. Africanizing the educational system will help the Africans to develop a consciousness and a deeper awareness of their own identity, history, and culture. Therefore, it is the duty of every African leader and those leading the educational sectors in cooperation with educators to implement this to equip their students with the basic skills ingrained on African cultures and traditions; drawing those skills and knowledge from their local environments and surroundings as the important foundation and sources of knowledge. They need to give space to indigenous knowledge because through this the values found in African cultures will be strengthened as central sources as well as a resource of cultural knowledge. This will promote Africans to develop their own science from the local surrounding to respond to their problems, this local based scientific research powered by culture is very vital to human existence and survival in their environment.

The European Social Constructs and its Implications on the Economic Progress of Africa

The African paradox

What precisely is driving Africa regressively? Do African leaders need European consultants to start rising in the social order? why is Africa the scene that is much-preferred ground for transnational political ideologies? Must African leaders go to Europe or America for economic, political advice, and benchmarking? Why can Africa not feed herself? A lot of queries flow from my mind that needs serious attention about Africa. Firstly, Africa(ns) need to be free from external forces for the purpose of restructuring her economics and political systems to manage well what she has. The purpose of this rearrangement is to address the recurrent questions of our continent, a continent that is gifted and enormously affluent in natural and human resources, yet it is still in one way or another unbelievably has succeeded in enduring the poverty status. Why is Africa been associated with poverty yet Africa is very rich in resources: Sub-Saharan Africa enters the new century with many of the world's poorest countries. The average income per capita is lower than at the end of the 1960s. Incomes, assets, and access to essential services are unequally distributed. And the region contains a growing share of the world's absolute poor, who have little power to influence the allocation of resources.⁴⁵

Africa is not poor but Africa is a potentially affluent continent if we were to prove this, how can a continent with, "40 percent of the world potential hydroelectric power supply with the bulk of the world's diamonds and cranium, notwithstanding, Africa has 30 percent of the uranium, 50 percent of the world's gold, 90 percent of cobalt, 50 percent of phosphate, 40 percent of

⁴⁴ Ngugi Wa Thiong'o, *Writers In Politics Essay*, Part I.

⁴⁵ George B. N. Ayittey, *Africa Unchained the Blueprint for Africa's Future*, 4.

platinum, 7.5 percent of coal, 8 percent of petroleum, 12 percent of natural gas 3 percent of its iron ores and millions and millions of tracks of land not tilled”⁴⁶ be described as a poor continent that must be pumped with foreign aids for its citizenries? From the above citation there is no room for poverty, how can poverty exist in Africa amid such plenty of resources? It does defeat my simple logic-poverty and plenty?

Economic conditions in Africa have deteriorated frighteningly, which should not have been the case given the continent's immense development potential and untapped mineral wealth. As an old continent, it is the source of strategic minerals, such as tantalite, vanadium, palladium, uranium, and chromium. It has the bulk of the world's gold, cobalt, diamonds, and manganese. Compared to the Asian continent, Africa is not overpopulated. Therefore, it has enormous unexploited potential in resource-based sectors, it also has hidden growth reserves in its people-including the potential of its women, who now provide more than half of the region's labor force.”⁴⁷ Hitherto, paradoxically Africa with such wealth is struggling like it was born in perpetual poverty couple with unceasing chaos notwithstanding such enormous wealth and potentials.

The African continent has been presented as an affluent and wealthy continent with a lot of natural resources. The paradox is that the resources from the heart of Africa are not being used for the good and benefit of Africa(ns), but the benefits of other continents other than Africa. The question is why is the content, “inexorably mired in steaming squalor, misery, deprivation, and chaos,”⁴⁸ are these bedlams not sponsored by those who feel to plunder these enormous resources for their own profit? And this prompts me also to reiterate a question by Deputy Chairperson on the 55th Commemoration of Africa Day in Ankara, Turkey, “Why is it that the world’s richest continent has some of the world’s poorest people?”⁴⁹ Look at what is happening in Libya or DRC Congo, Africa is not peace with herself! Africa is not poor by itself it has been made to be poor by her exploiters “...land, the human and mineral resources could be exploited with African labor for the benefit of Europe,”⁵⁰ Nkrumah observed:

“It has often been said that Africa is poor. What nonsense! It is not Africa that is poor. It is Africans. And they are impoverished by centuries of exploitation and domination.” That is why we are poor. It is a product of history. It was caused by man, and it can be therefore be addressed by man.”⁵¹

Indeed, in the same speech, Boris Johnson confirmed this fact that they were indeed the course of African problems, “The continent may be a blot, but it is not a blot on our conscience. The problem is not that we were once in charge, but that we are not in charge anymore.”⁵² Boris should be reminded that the question is

not “once” or “now,” Wisdom J. *et al.* in their book, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana* answers him that, “we still need to be mindful that, imperialism is largely to blame for the underdevelopment of [Africans]. It was imperialism that enslaved and demoralized them, assaulted their culture, plundered their material resources, and rendered their economies incoherent,”⁵³ that they were the root course hence they should be responsible.

Far from that, the poverty an African is experiencing is both real and psychological, that means Africans have been made to think that they are poor and their existence should be at the mercy of foreign aids, scholarships, loans, grants, and other mechanism that the international organizations and the so-called NGOs have put in place to encourage this mentality yet the continent is rich. Ayittey acutely observed that “Instead of being exploited for the benefit of the people, Africa's mineral resources have been so mismanaged and plundered that they are now the source of our misery.”⁵⁴ This was later explicated well by Rodney who explains this brazenly:

The question as to who, and what, is responsible for African underdevelopment can be answered at two levels. Firstly, the answer is that the operation of the imperialist system bears major responsibility for African economic retardation by draining African wealth and by making it impossible to develop more rapidly the resources of the continent. Secondly, one has to deal with those who manipulated the system and those who are either agents or unwitting accomplices of the said system. The capitalists of Western Europe were the ones who actively extended their exploitation from inside Europe to cover the whole of Africa. In recent times, they were joined, and to some extent replaced, by the capitalists from the United States; and for many years now even the workers of those metropolitan countries have benefited from the exploitation and underdevelopment of Africa.⁵⁵

Above and beyond, we want Africa where there is equality in diversity in terms of gender, opportunity, affordable good life and with highly educated people and all these needs appropriate leadership and willingness by Africans and these have not been realized in Africa partially because of poor leadership that is mirrored in egotistical leaders who are corrupt and morally deceitful, but the problem of leadership is not all in all the problem of Africa, Africans also need to fine-tune themselves towards the leaders with good leadership qualities that will champion their needs and ideologies since that power of change lies within their capacity. Besides Africans needs to be unified in their diversity, the Europeans are always succeeding in planting their ideologies in Africa because they find Africa so diverse with multi-ethnic societies but weak in unity therefore easy to be penetrated and be

⁴⁶ David lamb, *The Africans Encounter from Sudan to the Cape* (New York: Randon House Inc, 1985), p.28.

⁴⁷ George B. N. Ayittey, *Africa Unchained the Blueprint for Africa's Future*, (New York: Palgrave Macmillan, 2005), chapter one p.2.

⁴⁸ David lamb, *The Africans Encounter from Sudan to the Cape*, 28.

⁴⁹ You can find the speech on www.au.int.

⁵⁰ Ajayi, J. *et al*, *The African Experience with Higher Education*, 25.

⁵¹ A quote in that speech “Africa is on the move” by the Deputy Chairperson on the 55th Commemoration of Africa Day in Ankara, Turkey. See www.au.int.

⁵² See www.au.int.

⁵³ Wisdom J. *et al.*, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, 361/2.

⁵⁴ George B. N. Ayittey, *Africa Unchained The Blueprint for Africa's Future*, p.1.

⁵⁵ Walter Rodney, *How Europe Underdeveloped Africa*, (Washington, D. C: Howard University Press, 1982), Xii

divided through inflicted wars and fighting. This, therefore, is a call to every African both in Africa and diaspora to have a sense of goodwill with each other and accept their diversity as their strength, in others words, there is a need for every African to follow the precepts of pan-Africanism, since “indeed, it is not easy to develop a strong national consciousness when people from different ethnic groups, though dwelling within the same political boundaries, fail to acknowledge and respect the humanity, rights, and dignity of others who are different in the ethnic sense. There is always an unspoken fear and threat of subjugation and domination by others.”⁵⁶

In this way, they shall have gained control of their continent, their own autonomy, and their natural resources that are being exploited for the sustenance of those who enslaved them and continue to exploit their economic resources for their own advantage. This emancipation proclamation process must be signed in every African mind for their liberation. In this way, economic, political, and social developments with true transformation will find their safest dock in Africa.

Consequently, we must be obligated to consider the causes and repercussions of the encounters between Europe and Africa. If we are to go with above implications, the Europeans have managed successfully through what I may call disorganization of African political leaders through setting them against themselves in wars and dividing Africa into their language blocks, this has enabled them to paralyze the leadership systems in Africa since African leaders are tone between two global forces of oriental or occidental worlds. As a result, the African values embedded in *Ubuntu* have been polarized and diminished by the instantaneous rapid economic growth promised by the orientalist by promoting socialism in Africa while the occidental promised the Africans a bouquet of development through capitalist. The choice was *either or* less one faces a gun. Africans were set on a battle within themselves depending on the choice of your camp, in any case, it was a quandary situation. One had to adopt capitalism or communism as an ideological tool of development, leaving their own because they were made to believe that either is best for them but in any case, both are tools for development but not a universal recipe that can be plucked and planted anywhere, that is the extend African national leaders became politically concubines.

The early African Nationalist politicians generally speaking were inclined to Marxist ideology. This was pleasing provided that they were fighting the battle against imperialism and colonialism. Later, upon attaining the independence they realized two things: that Marxism was irrelevant in Africa considering her situation and condition, it was impractical; the second thing that came into their minds (the early African political leaders) they grasped the need to be authentic Africans, this compelled them to look for ideologies that would make them authentic Africans, those principles, philosophies and believes that would enable them and fine-tune them to the world affairs as authentic recognized people. The early African political leaders wanted to champion ideologies that are based on African cultural ideals of her own that

would contribute to human development, that desire was alive and well revealed in different movements like negritude, humanism, African socialism, Ujamaa, and many others, such principles were seen as basically in opposition to Marxism and other imperial systems. But imperialism creeds like capitalism and communism smashed their efforts. Even religion that should promote the sociological essence of the society in terms of describing peoples’ beliefs and practices concerning their ultimate reality also falls a victim in this case. Religion also has been used as a tool for propelling these imperialists systems, regarding how religion have been misused in perpetuating this imperialists culture in nutshell here is a reference from Jomo Kenyatta that you can ponder about: When the missionaries arrived, the Africans had the Land and the missionaries had the Bible. They taught us how to pray with our eyes closed. When we opened them, they had the land and we had the Bible.⁵⁷

Is that how civilization should be carried out? Was it civilization or calculated larceny? I do not know but one can make his or her deductions. Religion appears to be the most selling item that the Europeans brought to Africans whom they demonized their traditional forms of worship as dissolute majorly because they felt insecure about their own moral values. Any religion in its essence and practice should help to integrate all facets of culture in providing support for the essential values of a society and making people creative and productive in the society in terms of morality compartment. But western anthropologists look at African religions with a lot of partialities. In the words of Sir Samuel Baker an explorer laconically remarked: Without any exemption, they are without a belief in Supreme Being, neither have they any form of worship or idolatry; nor is the darkness of their minds enlightened by even a ray of superstition.⁵⁸ Such a position is incoherent and should not be admitted there are as many as possible numerous forms of religions in traditional African societies.

What way for Africa?

So, if Africans want to grow, they must learn how to pray but with their eyes opened and they must, by all means, divorce from all these imperialists intermarriages with them through the formulation of appropriate deconstruction ideas to rewrite these concepts. As Maillu reminds us that there nothing that can prevent Africa from developing because, “there is nothing that makes Nigeria different from Mali, or Sudan different from Somalia, or Kenya different from Tanzania and so on except the boundaries which Europeans made when they were sharing the continent between themselves,”⁵⁹ and these boundaries are not just physical but they are psychological perpetuated through European languages and religious divisions inter alia that aim at chaining the African person’s mind so that they cannot think objectively but rejoice in celebrating the white man’s culture while his or her cultural values that define him or her is under great manipulation till date when China and America are exploiting Africa to the core.

⁵⁶ Wisdom J. Tettey, Korbla P. Pupilampu And Bruce J. Berman, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, 114.

⁵⁷ Jomo Kenyatta see in David Lamb, *The Africans* (New York: Random House Inc, 1982) 59.

⁵⁸ Samuel Baker, *The Races of The Nile Basin, Translation of the Ethnological Society of Landon*, NS, v, 1891, I, 423-4).

⁵⁹ David G. Maillu, *African indigenous political ideology*, 59.

African Economic and Political Liberation Trajectory

The fall of Africa economically was marked by the robust industrial revolution that was intensifying in England and Europe, this revolution led to Europeans looking for resources (material and human) to sustain their industries, this led them to have an encounter with Africa rich and pregnant with these resources. History shows that this Industrial Revolution really was fueled by the slave trade that was coming from Africa. Africa was the supermarket of this banquet, "Governor John Hippisley, writing on the Population of Africa, observed that, I quote, "the extensive employment of our shipping in, to and from America, the great brood of seamen consequent thereon, and the daily bread of the most considerate part of our British manufacturing, are owing primarily to the labor of negroes. The negro trade and the natural consequences resulting therefrom may justly be esteemed an inexhaustible fund of wealth and power to this nation."⁶⁰ Let us not go deep but I feel that it was important to have that panoramic view of history since is not easy for an African, in this case, to talk about Africa deprived of discussing the ancient issues associated with her problems these days.

There is a need to deconstruct these ideas to pave ways to the African developmental path of becoming an economically super state, and it must be done by African themselves, Ngugi cried for this need of "historical negation of things" saying, "The essential characteristic of imperialist domination remains the same: the negation of the historical process of the dominated people employing violent usurpation of the freedom of development of the national productive forces... We can state that national liberation is the phenomenon in which a given socio-economic whole rejects the negation of the historical process. In other words, the national liberation of a people is the regaining of the historical personality of that people, its return to history through the destruction of the imperialist domination to which it was subjected... National liberation exists only when the national productive forces have been completely freed from every kind of foreign domination,"⁶¹ at least from this racial tangent, he meant that for this process to be successful then the deconstruction of the historical negation must primarily be anchored on economic and political liberation that was previously marginalized to occupy a space in the mainstream although Nkrumah had a contradictory view of Ngugi for him politics comes first then economic liberation, "The basis of colonial territorial dependence is economic, but the basis of the solution of the problem is political.

Hence political independence is an indispensable step towards securing economic emancipation."⁶² But both scholars are on the same page since the bottom-line is the African cultural liberation from eurocentrism.

Indubitably, Africa's economic condition is not all in all downhearted Africa has some achievements with some successful economic landmarks, nonetheless, they are upsettingly limited. I also recognize that the problem of development in Africa is a multifaceted one for instance far from external factors we have seen there also internal factors like, "corruption, political instability, poor infrastructures,"⁶³ etcetera that needs diverse tactics but deconstruction could be the first step to solve those sundry problems since Africans did not consult the Europeans on how to construct all these concepts to manipulate, control and dominate them, correspondingly, the Europeans will not help Africans to come up with deconstructive ideas since it nearly rationally and realistically impossible for the self-proclaimed arc-priest to preach redemption news to the slaves that have been serving him for long, it is a great joke if he makes that attempt. But it is Africans who should trigger such projects. In the words of Nyerere, 'our first step, therefore, must be to re-educate ourselves; to regain our former attitude of mind.'⁶⁴

So economic and political liberation based on culture is first ingredients to be liberated primarily in this struggle to reinstate the African identity and personality to its right human state; the African personality is to be encouraged, through the development of African folklore and language⁶⁵

Any liberation actions always begin by declining the principles of the colonist, by renouncing their religious conviction and the whole educational system; usually it by rejecting colonist's domineering cultural elements that embody his structure of values. This is a battle that needs a collective effort and Ngugi put it, "We writers and critics of African literature should form an essential intellectual part of the anti-imperialist cultural army of African peoples for total economic and political liberation from imperialism and foreign domination."⁶⁶

One thing we have to extremely accentuate is that culture plays a critical role in development and growth of any society since for a society develop economically it is a whole process of man interacting with his natural ecosystem system by using his labor power and knowledge he has gathered through experience as essential tools to bring about economics in his or her social environment for his or her existence in the community. This makes

⁶⁰ A quote in that speech "Africa is on the move" by the Deputy Chairperson on the 55th Commemoration of Africa Day in Ankara, Turkey. See www.au.int

⁶¹ Ngugi Wa Thiong'o, *Writers in Politics Essays*, Part I.

⁶² Kwame Nkrumah, *Revolutionary Path* (London: Panaf books, 1973) P.15.

⁶³ For instance, Nyerere, remarked that, "In my view, three factors militate against economic and social growth in Africa. The first of these is corruption. This is a widespread cancer in Africa. The second factor which makes business reluctant to invest in Africa is political instability. But even if African countries were to become paragons of good governance and political stability, despite the corruptive and disruptive nature of poverty itself, foreign investors would not be coming rushing to Africa. Most African countries still lack the necessary physical

infrastructure and the education and training in skills needed for rapid economic and social development. This, in my view, is the third and the most important factor militating against significant flows of foreign direct investment to Africa. (*PanAfrican News*, September 1998), see also, George B. N. Ayittey, *Africa Unchained the Blueprint for Africa's Future*, 9.

⁶⁴ Alyward shorter WF, *African Culture and The Christian Church*, 26.

⁶⁵ Manning Marable, *African and Caribbean Politics from Kwame Nkrumah to the Grenada Revolution* (Norfolk: Thetford Press Thetford, 1987), p. 62.

⁶⁶ Ngugi Wa Thiong'o, *Writers in Politics Essays* part I p.31.

him or her have economic society; that society that manifests itself in an economic alignment characterized with some economic arrangements as a result of his or her applied labor, science and technology however crude or rudimental they may be, thereby production process occurs as a result of that chemistry of man and nature coming in mutual interaction. Now, in the process man realizes he interacts with the fellow and they create a political structure on how to control these natural resources to avoid bumping into each other, they form a government through what is seen in Hobbes, Jean-Jacques Rousseau and John Locke in their political philosophy as *the social contract*,⁶⁷ to help in regulating their self-interest through rational consent. In that process, the society manifests itself culturally; it forms a cultural milieu through these economic and political arrangements thereby forming an economic and political edifice. From there, that society creates its educational structure, others like spiritual structure springs up around its ideological values that shape their moral mannerism and characters as philosophical forces that explains its social interactions so, one can see the role of culture in the community's growth and progress as it is based on some historical foundations of accumulated knowledge that defines its identity and destiny and there are, "I think three crucial lessons to be learned from these cases. First, that identities are complex and multiple and grow out of a history of changing responses to economic, political, and cultural forces, almost always in opposition to other identities."⁶⁸

Proposed Economic Solutions

On the same economic tangent, I concur with George who argued that "Turning things around requires development or economic growth, and the key to growth is an investment both foreign and domestic investments. Investment then is the way out of Africa's economic miasma and grinding poverty. Africa needs investment in agriculture, manufacturing, education, health care, telecommunications, and infrastructure,"⁶⁹ as key areas to her development trajectory, further to this sustainable development must be a priority in this process of turning things around for long term solutions. African political leaders also need to prioritize their capacities to process goods apart from just nationalizing

⁶⁷ According to Hobbes (*Leviathan*, 1651), the state of nature was one in which there were no enforceable criteria of right and wrong. Each person took for himself all that he could; human life was "solitary, poor, nasty, brutish and short." The state of nature was therefore a state of war, which could be ended only if individuals agreed (in a social contract) to give their liberty into the hands of a sovereign, who was thenceforward absolute, on the sole condition that their lives were safeguarded by sovereign power. Locke (in the second of *Two Treatises of Government*, 1690) differed from Hobbes insofar as he described the state of nature as one in which the rights of life and property were generally recognized under natural law, the inconveniences of the situation arising from insecurity in the enforcement of those rights. He therefore argued that the obligation to obey civil government under the social contract was conditional upon the protection not only of the person but also of private property. If a sovereign violated these terms, he could be justifiably overthrown. Rousseau (in *Du contrat social*, 1762) held that in the state of nature man was unwarlike and somewhat undeveloped in his reasoning

projects. This will help in the rapid generation of wealth when productive capacity in the production process is enhanced with a good competitive market environment in the global market. Numerous attempts to realize this are witnessed also as:

It is also true that several African countries have initiated economic reforms aimed at increasing the role of the private sector and moving to a market economy. State-owned enterprises have been privatized and various state controls have been removed. Besides, steps have been taken to restore and maintain macroeconomic stability through the devaluation of overvalued national currencies and the reduction of inflation rates and budget deficits. Furthermore, African countries have also improved their regulatory frameworks for FDI, making them far more open, permitting profit repatriation, and providing tax and other incentives to attract investment.⁷⁰

Africa needs to change her economic gears and she stands at a very nice opportunity and time since one of her beaux had croaked, communism, she has a very nice opportunity to divorce the current beau who is exploiting her right left and center; capitalism. The same way the western civilization is perishing gradually as predicted by Spengler, "your dying. I see in you the characteristic of the stigma of decay. I can prove that your great wealth and great poverty, your capitalism and socialism, your wars and your revolutions, your atheism and your pessimism and cynicism, your immorality, your broken down marriages, the birth-control that is bleeding you from the bottom and killing you off from the top in your brains- can prove to you that there is a characteristic mark of the dying ages of the ancient states,"⁷¹ so also shall its strong tenets like religion and capitalism that seem to be resilient in Africa shall die a peaceful death and the African way to grandeur shall be cleared from the constructed sociocultural domination and oppression that has occasioned her social crumbling and fragmentation of cultural values and the formation of indigenous civilizations on numerous heights. One should ask not when and in what condition shall this find Africans, all Africans need foremost is liberation so that they can be free physically and psychologically levels from eurocentrism ascendancy. This paper is not designed to encourage racism, all in

powers and sense of morality and responsibility. When, however, people agreed for mutual protection to surrender individual freedom of action and establish laws and government, they then acquired a sense of moral and civic obligation. In order to retain its essentially moral character, government must thus rest on the consent of the governed, the *volonté générale* ("general will"). See "social contract." Encyclopedia Britannica. *Encyclopedia Britannica Ultimate Reference Suite*. Chicago: Encyclopedia Britannica, 2014.

⁶⁸ Kwame Anthony Appiah, *In my Father's House*, Africa In the Philosophy of Culture (New York: Oxford University Press, Inc.,1992), 178.

⁶⁹ George B. N. Ayittey, *Africa Unchained The Blueprint for Africa's Future*, p.6.

⁷⁰ George B. N. Ayittey, *Africa Unchained The Blueprint for Africa's Future*, 7.

⁷¹ Richard Wurmbrand, *Tortured for Christ*, (Glendale C.A: A Daine Book Papers USA, 1976), P.80.

all, we are human and we serve one God despite different religious doctrines of this same God and we are bound by humanity as our umbrella, we are all neighbors of each other be it black or Whiteman, the color should not be our great division but should be our great diversity and proudness in one another and it is our God-given responsibility to be virtuous to each other, but we need to clear the ground on some of the broadcasted images that have been projected towards Africans that they are extraneous and are meant for self-gain. They are but unpolished chauvinistic western propaganda to express themselves in theory and practice by fashioning a permanent false depiction to Africans with the intent of creating cultural extermination of those they tyrannize. I agree that “no culture is absolute, and that “social, political, and linguistics realities could be arranged in numerous ways, *but this culture of marginalizing other cultures* that national identities have been constructed arbitrarily, that languages and nationalities have been linked artificially,” is not right.⁷²

The Crossroads Faced by An African Today

As we speak now an African is suffering from some of the dualities which they have established themselves but their innermost being keeps rejecting these dualities of whether to be African or European. Few of them have discovered that without autonomy to the self they cannot or will not exist authentically, this is well elaborated by some scholars like David, “For the sake of tomorrow's victories, we must take another look at the events of yesterday...in the Congress, black people will begin to rediscover themselves as the active creators, rather than the passive sufferers, of history's events; the subjects, rather than objects, of history. It is only when we have rediscovered this lost perspective on ourselves that we can truly begin to speak of emancipation; it is only when we have returned to our authentic past that we can truly begin to dream about the future.”⁷³

The problem of the Africans is that they want to be at one point and at the same time themselves and that of the white whose mannerisms they have internalized. The skirmish in this lies sharply in the tangent of choosing between exclusively being themselves or being dual in their citizenship; between expelling the European practices that have subordinated their cultural practices or not expelling them; between being human camaraderie or being alienated from each other; Africans also have a long way to go in choosing between cooperating with prescriptions of their masters in their political, economic, religion and sociological governance or follow their own prescriptions of governing themselves; the African is also at liberality state of choosing whether to be spectators to the developments projected to his destiny or be actors in designing of their destiny and autonomy; they must also chooses either to be acting or continues to be illusioned by the actions of their masters; they must also chose to be objective and mentally free in articulating their demands or be inaudible and emasculated in their own autonomy

that define their authenticity and authority to discover, invent, master, renovate, create, recreate, and design their world. These are the catastrophic Catch-22 that the Africans find themselves. The resolution cannot be realized in theoretical footings. For the Africans to be able to manage the skirmish for their deliverance, they are required to perceive the reality of domination not as a locked ideal world that has no doors of exit, but as a real situation that they can change. This acuity is essential but not a satisfactory condition for deliverance but it should be the inspiring vigor for redemptive action to breakthrough from the chains which Fanon put in other words as, “Europe has laid her hands on our continents, and we must slash at her fingers till she lets go.”⁷⁴ Renown Kenyan novelist fervently put it contrarily, “If we want to turn Africa into a new Europe, then let us leave the destiny of our countries to Europeans. They will know how to do it better than the most gifted among us.”⁷⁵

The central problem is this: How can the Africans, as divided by their masters along so many lines like politics, economics, religion, and language that has made them not autonomous beings, partake in developing their own way to freedom? Well, this is a gradual process as they realize and discover themselves as the “the housing roof” to the European supremacy until they come to the full realization of this, then they can contribute to the struggle of redeeming their identity through critical education based on African culture. Critical education rooted in African culture will affirm and value home-grown knowledge and devalue the imposed colonial ideologies that were constructed to see Africans as inferior and as disauthenticated people lacking the native knowledge thus devoid of identity, lacking descent and history, therefore, they were invented, people.

In as much as they continue to live in the dyad that promotes the philosophy that “to be” an African is “to be” comparable, this boils down to the fact that to be comparable follows necessarily to be comparable to the master, this influence is appalling. They need a certain kind of education of their own that should be contributing to their discovery of self and autonomy this can be done through finding a middle ground to “develop a philosophy for both Africa and African in terms of education that recognizes the best of both philosophies so that no person is left behind unless they choose to be. This approach must view people as persons and encourage every African to become a person in the African sense,”⁷⁶ such enterprises should be championed through instituting in every part of Africa especially in the universities the center of African studies similar to the one found in Tangaza University College, Kenya Department of African Studies (TAMCAS), Tangaza Maryknoll Centre for African Studies. Such institutions should be directed towards transforming Africans perceptions and thinking to celebrate and critique the dynamism of African cultures, create awareness and appreciation of the multicultural context of African societies, and to learn the fundamentals of African cultures and their importance.

⁷² Wisdom J. *et al.*, *Critical Perspectives in Politics and Socioeconomic Development, in Ghana*, 362. The italics are my emphasis.

⁷³ David Austin, *Moving Against the System* (London: Pluto Press 2018),15. Also get the book: www.btlbooks.com.

⁷⁴ Frantz Fanon *The Wretched Df The Earth*, Preface by Jean-Paul Sartre Translated by Constance Farrington, (New York: Grove Press New York, 1963), p.12.

⁷⁵ Ngugi Wa Thiong'o, *Writers In Politics Essays*, Part I.

⁷⁶ See an article of Postgraduate Conference on *African Philosophy* Philosophy Department (University of Cape Town: HUMA Seminar Room, Neville Alexander, August 19th, 2016.

That transformation will enable them in Frantz Fanon's words in the *'the wretched of the earth'* to move from *'being for others'* to *'beings for themselves,'*⁷⁷ I do not imply here that the educational method ought to be condensed to that process of radical transformation. Hitherto, though they wish (Africans) to be authentic in their existence and regain their identity which has been manipulated, they are still fearing to launch this war but I must give kudos to those few scholars like Odera Oruka, Chinua Achebe, Oriare Nyarwath, Anta Diop, Ngugi was Thiong'o, V.Y Mudimbe, Frantz Fanon etcetera who have laid the great foundation to African liberation from eurocentrism not forgetting our nationalist fathers who inspire some of them with their ideologies and slogans.

Political and Economic Freedom: Self-Autonomy

But for the triumph of Africans to have control over their autonomy, they need to deconstruct the old concepts that the dominator had imposed on them and they accepted without being cognizant, they have no choice but to deny that praxis indoctrinated in them so that they be empowered to be deliberate in their own thoughts and this requires proper education championed by African scholars. It is indispensable for the Africans also to understand that when they declare the struggle for their way to humanization and identity discovery then, they also declare, from that instant, to commit their total responsibility for the struggle of self-autonomy. They must know that they are struggling not simply for autonomy but also, they are struggling for self-determination to create, recreate, design, innovate, and renovate their worldviews. Such struggles entail that each one of them plays his or her role actively as well responsibly. We have confirmed that the imperialist powers whether in direct or indirect will at no time relinquish the political and economic domination they have imposed over their colonies till they are forced to do so by those colonies for them to be free to govern themselves without outside interference, this is the cry that Kwame meant by "Africa for the Africans!" I cried..." A free and independent state in Africa. We want to be able to govern ourselves in this country of ours without outside interference."⁷⁸

When these external interferences are surely eradicated then Africa will be a cohesive continent that is politically and economically united as a super continent founded on the canons of her cultural settings. This can be realized when Africans are autonomous and self-determined for their freedom. Africa stand in a very good trajectory of robust development and growth both in socio-economic and political transformation if they regain local autonomy that will give them control over their political and economic destiny, this will help profoundly in rolling back her empire's achievements only when she attained continental-autonomy and independence otherwise the contemporary metamorphosis that is witnessed in the continent whether, in economics, politics or education is just but a transformation from

colonialism to neocolonialism that is decelerating rapid development.

II. CONCLUSION

To attain this, there a need of inventing a construct that will withstand and outweigh the European discourses, and education takes the central scene here, this war cannot be worn when our learning institutions are stratified on imported traditions that cannot allow them undertake whatsoever key reforms that are relevant to the African natives; this is inhuman, and to pretend that it is undertaken in a good faith by African governments to preserve and conserve the cultures of the natives is not only intelligently deceitful but also culturally deceiving but, if there is that need of infusion (Africanization) then it must be based on diversity as well as the flexibility in both cultures for proper amalgamation in order to have a high-breed (with Africanized identity) with educational contents trajected towards the needs of the people, in this manner there will be the possibilities of de-inventing the invented Africa economically, politically, educationally, racially hence decolonization when we focus on such scholarship then we shall uplift the Africa even from her economic and political quagmires. It is on this cultural construct formation that will help Africa to define her identity. African formation of a social construct is the direct antithesis of Eurocentrism construct theory. This is the "oppositional worldview" that Bell refers to when she counsels Africans to wash their homes clean it notable to ponder about her, "The one place where all black people can create an oppositional worldview, theory, and practice of well-being that does not need the support of any outside structure, is in our intimate lives, in our homes. Rather than making our intimate lives the locations of spiritual resistance where we defy imperialist white supremacist, capitalist patriarchy collectively, we have allowed our homes to become battlegrounds where there is no foundation for healthy self-esteem. And yet if we do not lay the groundwork there, early on when black children are constructing their core identities, it becomes harder, not impossible but way more difficult, for us to repair the damage done and lay the groundwork for self-esteem."⁷⁹ Unless we do that, we shall attain that level of self-governing of independence so that we can let go free the patterns of beliefs and conduct that are preventing us from being self-autonomous; the European system and patterns of reasoning. Meanwhile, because our society is designed based on the Eurocentric patterns and principles it perpetuates that colonized attitude. Nevertheless, our cultural values and policies can be used to counterattack this Eurocentric socialization thought patterns on our people. This is the area African philosophy should focus on to make it more authentic and powerful otherwise, "African philosophy is powerless and meaningless if it cannot be a means of constructing the future. Genuine African philosophy is one that in its engagement in the struggle against domination exhibits a pragmatic flavor. Otherwise, it is nothing more than a tool of

⁷⁷ Leonard, *Paulo Freire: A Critical Encounter* (London: Routledge, 1993), p. 1.

⁷⁸ Kwame Anthony Appiah, *In my Father's House Africa In The Philosophy Of Culture* (Oxford New York: Oxford University Press, 1992)

⁷⁹ Bell Hooks, *Rock My Soul-Black People and Self-Esteem* (New York: Gloria Watkins, 2003)

domination."⁸⁰ Concealing previous acts of conquest in their minds, Africans want not to go back to the bad experiences of political subordination, economic subservience, and cultural domination marked by relegation and dehumanization as witnessed in the slavery period, we want to transcend this and be free and autonomous in our undertakings and contribute to the global human development.

We want a symbiotic relationship with other cultures without cultural domination but a reciprocal rapport that promotes egalitarianism. Such relationships promote the independence, dignity, and autonomy of the people as well it acts as their security in terms of cultural preservation and makes people think objectively and freely, this kind of framework makes people attain intellectual, economic and political freedoms if they are in the free social world. Human beings should be free by nature to design his world according to his worldviews, man is an entity and an end himself not means to an end as we have seen in Eurocentric social and cultural domination.

The African decolonization and revolution process must be centered on the African man and his possibilities. Such revolutions should make Africans more aware of themselves and their obligations concerning the progress of the universe in terms of human development contributions. It is a fact that people (races) gain value according to their contribution to world's development and Africa needs to rise in that criterion to be respected in terms of their global contribution to global progress.

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Gender Inequality: A Vulnerability Factor To Hiv Infection Among Heterosexual Couples In Kenya

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Abstract: Gender has been recognized as a major issue that is central to the spread of HIV and AIDs infection. Women are more vulnerable to HIV infection due to their biological susceptibility, limited sexual autonomy and men's power to control sexual activities. Gender- based social inequalities have been observed in which women lack the power to protect themselves from contracting HIV. Women are more susceptible to HIV infection through vaginal intercourse as they are exposed to infectious fluids longer during sexual intercourse than men. Pressure and Release Model, was used to drive this study. Mixed method research design was used to address the phenomenon under investigation. The study population comprised of 1180 heterosexual couples who were randomly selected and 73 key informants who were purposively selected. Primary data was collected using structured questionnaire and interview schedule. Descriptive and inferential data analysis were performed to derive meaning out of the collected data. The study established that gender inequality is a major factor influencing heterosexual couples' vulnerability to HIV infection in Kakamega County, Kenya. The study recommends need to intensify sensitization campaigns to boost couples' knowledge on HIV pandemic in order to reduce their vulnerability to HIV infection.

Key words: Gender inequality, heterosexual couples, HIV infection, vulnerability

INTRODUCTION

Gender has been recognized as a major issue that is central to the HIV and AIDs debate. It has been reported that Worldwide, 18.6 million girls and women were already infected with HIV besides the one million who were newly infected in 2015 (UNAIDS, 2017). In sub-Saharan Africa, women represent 59% of new HIV infections among adults aged 15 years and older. Women are more vulnerable to HIV infection due to their biological susceptibility, limited sexual autonomy and men's power to control sexual activities (Wagbara, 2017). Women have therefore become the most vulnerable group of HIV infection. Moreover, gender- based social inequalities have been observed in which women lack the power to protect themselves from contracting HIV, and men are more likely than women to infect their partners because they engage in more risk sexual behaviours. In this case Higgins *et al.*, (2010) noted that men are active transmitters of HIV but inactive agents of prevention.

Women have twice the chances of getting infection if they are exposed to HIV as compared to men (UNICEF, 2008). This happens because women are more susceptible to HIV infection through vaginal intercourse as they are exposed to infectious fluids longer during sexual intercourse than men are (Philbin, 2016). During sexual intercourse, the vagina sustains microscopic tears through which the virus enters the blood stream. Young girls are most vulnerable due to their immature mucosal epithelial linings which are even more easily torn during sexual intercourse (Huang, 20020). Moreover, increased vulnerability to HIV infection has been linked to intimate partner violence, which is commonly observed among younger women and women who are economically dependent on their male partners (Indicators, 2018).

Violence or the fear of violence can make it very hard for women to insist on safer sex and to use and benefit from HIV services (Mohammed *et al.*, 2017). Siemieniuk *et al.*, (2013) have confirmed that women infected with HIV who experienced intimate partner

violence were less likely to begin or adhere to antiretroviral therapy than other HIV infected women. Besides, violence against women contributes to women's vulnerability to HIV through fear to negotiate for safer sex (Gupta, 2000) and for those who are raped; the genital tears they sustain increase their probability of being infected with HIV (Qubuda, 2010).

LITERATURE REVIEW

In Africa women are more affected by HIV and AIDS. This is because in African cultures, women occupy an inferior position both socially and economically and find themselves acquiescing to men's risky sexual behaviour such as multiple sexual partners and not using condoms (ILO/AIDS, 2002). Gender inequality, HIV risks and vulnerabilities are inextricably linked. Women account for just over 50 per cent of all people living with HIV (UNAIDS, 2013).

Societal gender norms related to "feminine" and "masculine" roles, expectations and behaviours strongly affect women's and men's access to HIV information and services, their attitudes and sexual behaviour, and how they cope with the situation, should they or a family member be living with HIV (UNAIDS, 2011). Of the 33.3 million people globally living with HIV in 2009, 15.9 million were women (UNAIDS, 2010). In 2017, an estimated 18.2 million women were living with HIV, constituting 52% of all adults living with HIV, besides, an estimated 1.6 million new HIV infections in adults globally were among women (UNAIDS, 2017).

In East and Southern Africa 19.6 million people were living with HIV in 2017 of this more than half were women and girls (UNAIDS, 2017). However, infection rates among women are rising in several countries, as transmission patterns shift from high-risk groups to the general population where increasing numbers of vulnerable women and girls are becoming infected.

In Kenya women are among the groups mostly affected by HIV/AIDS. Statistics show that in 2016, women accounted for 910,000 of the 1.6 million people living with HIV in Kenya (NACC, 2016). The main reason is that women in Kenya are discriminated against in terms of access to education, employment and healthcare. As a result, men often dominate sexual relationships, with women being unable to practice safer sex even when they know the risks. Women and girls are more affected by the burden of caring for family members who are sick, which increases their unpaid workload while diminishing their access to schooling or income-generating activities (UNAIDS, 2011).

It is therefore against this background that this research sought to find out whether gender inequality is a factor of vulnerability to HIV infection among heterosexual couples in Kakamega County.

RESEARCH METHODOLOGY

Research design is a reflection upon a researcher's ideas with a focus on binding the research together through a blueprint that shows how the different parts of the research will work in unison so as to address the research questions (Asenahabi, Busula, & Ronoh, 2019). Mixed method research design was adopted to enable the researcher gather data, opinions and views about gender inequality as a vulnerability factor of HIV infection among heterosexual couples in Kenya. Mixed method research design will enable the researcher collect both qualitative and quantitative data. Under mixed method research design, qualitative research brings in open-ended data without predetermined responses while quantitative research brings in closed-ended data (Asenahabi, 2019). Triangulation design was used to integrate complimentary yet distinctly different data about gender inequality as a vulnerability factor for HIV infection among heterosexual couples.

The study population was heterosexual couples because HIV infection is best characterized as a sexually transmitted disease. Globally, more than 90% of new HIV infection among adults are acquired through sexual activity (Gouiwis et al., 2006), and heterosexual contact accounts for 80% of new cases of HIV in women (CDC, 2006). The units of analysis constituted of heterosexual couples, CASCO, SCASCOS, CACCs, HTC and CCC counsellors, Chiefs, Assistant Chiefs and Village elders in the area of study. A household in this research is represented by a heterosexual couple, and for every heterosexual couple only one member responded to the questionnaire.

A sample size of one thousand one hundred and eighty (1180) heterosexual couple respondents were randomly selected to take part in the study. Primary data was collected using a questionnaire for quantitative data and interviews for qualitative data. Questionnaires were used to get information about current conditions and practices and to make enquiries concerning attitude and opinion quickly and in a precise manner (Singh, 2006). An interview schedule, structured according to the research objective variables was used to collect raw data from the key informants who included the CASCO, SCASCOS, CACCs, HTC Counselors, Chiefs, Assistant Chiefs and Village elders.

Quality of the data collection instruments was ensured using both validity and reliability. The validity of the instrument is asking the right question framed in the least ambiguous way (Best & Khan, 2005). To ensure that the instruments have the content validity, they were submitted to experts for subjective judgment. To ensure items in the questionnaire and interview schedule are reliable, a pilot study was conducted. The reliability of the questionnaire was then checked by calculating the internal consistency using Cronbach's alpha coefficient to determine the extent to which the items that make up the scale are all measuring the same underlying attribute. The internal consistency reliability for the scale had a Cronbach alpha coefficient value of 0.746.

Qualitative data was analyzed and represented in text form. Quantitative data was analyzed using both descriptive and inferential data analysis.

FINDINGS

A. Gender of respondents

The heterosexual couple respondents were asked to indicate their gender and the results were as shown in Figure 1.

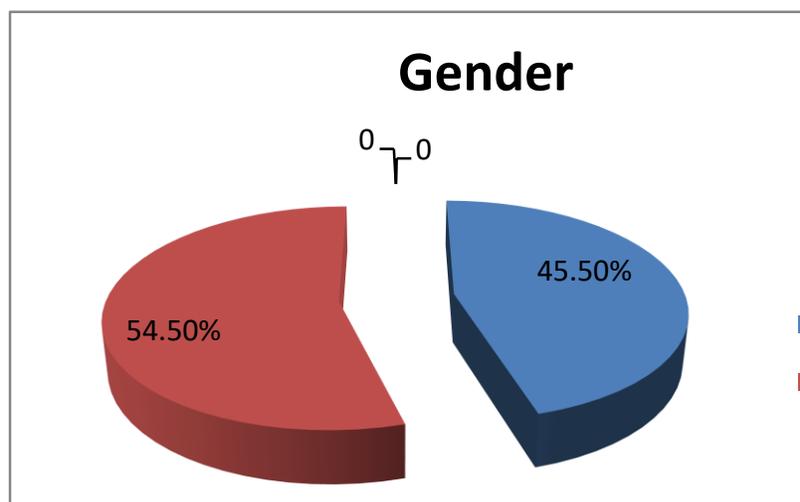


Figure 1: Gender of Respondents

A total of 1180 heterosexual couple respondents participated in the study. Of this population, 537 (45.5%) were males while 643 (54.5%) were females. The number of females who participated in the study was slightly higher than that of males.

B. Age Distribution of the Respondents

The target population of this study was heterosexual couples aged between 15 and 64 years. The respondents were asked to indicate their age and their results were as shown in Figure 2

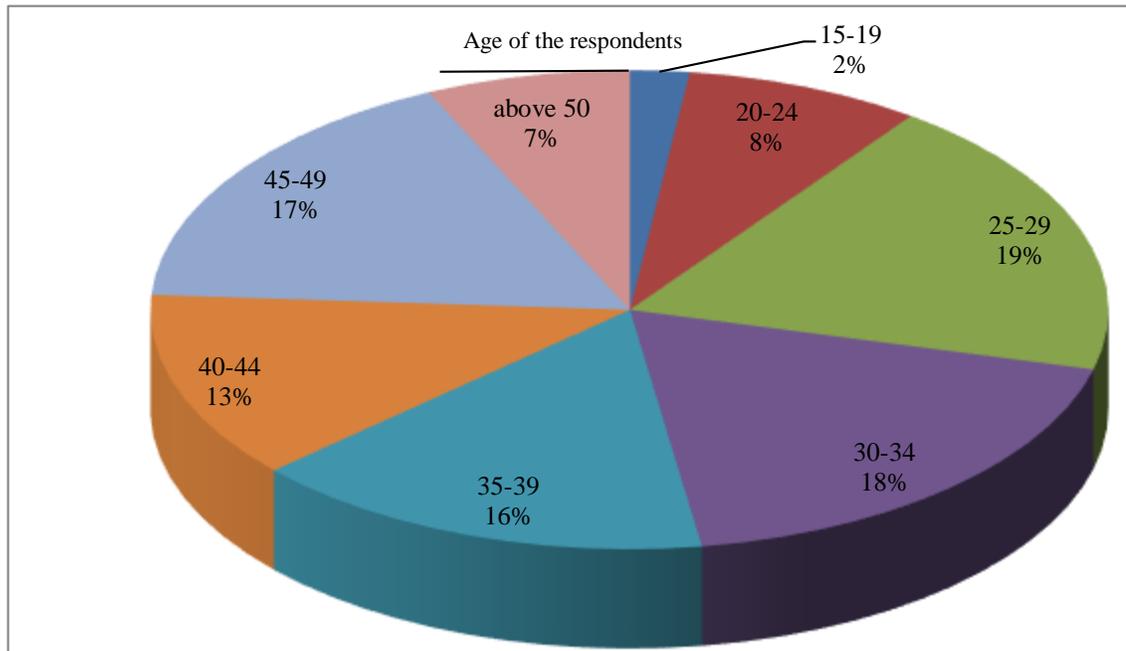


Figure 2: Proportion of respondents by age

Figure 2 represents the age proportion of the respondents who participated in the study. Heterosexual couples in the age bracket of 15 to 19 years were least represented with a proportion of 2%. This was followed by those who are above 50 years by a proportion of 7%. There is almost an equal distribution of heterosexual couples in the age bracket between 25 and 49 years.

C. Level of Education among the Respondents

Level of education was among the socio demographic characteristics considered for the heterosexual couple respondents. The heterosexual couple respondents were asked to indicate the highest level of education that they have attained.

The level of education varied from those who have no formal education to primary and secondary education, college or university education as shown in Figure 3.

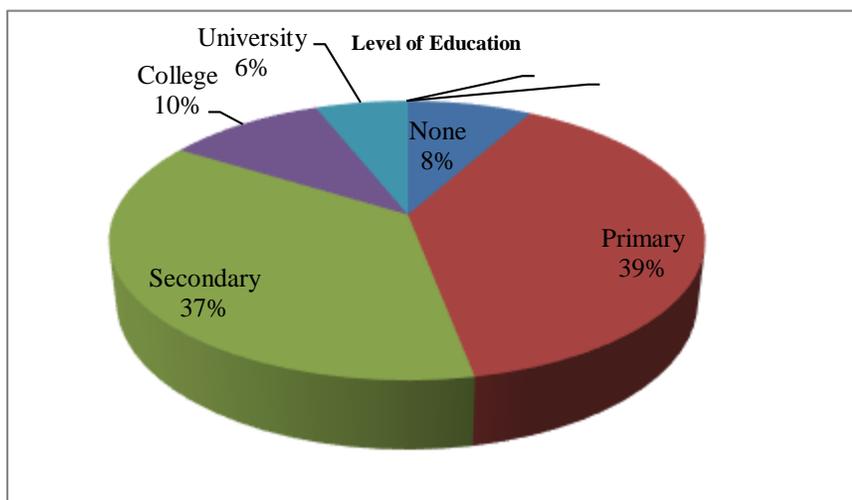


Figure 3: Level of Education among respondents

Of the 1180 heterosexual couple respondents who participated in the study 95 (8.1%) had no formal education, 461 (39.1%) had primary education, 433 (36.7%) had secondary education, 120 (10.1%) had gone to college and 71 (6.0%) had attained university education. The lowest proportion was among couple respondents with university education and the highest proportion was among those with primary education. The proportion of heterosexual couples who have primary (39.1%) and secondary (36.7%) education is highest and the gap between them seems to be narrow.

This result is in agreement with the report in “Kenya Economic Updates” (World Bank, 2013), that Kenya has made significant gains in making Basic Education accessible broadly, Basic Education in this case includes both primary and secondary education. The introduction of free and universal primary education, the increase in the number of secondary- day schools and the support the government gives to schools and learners in form of tuition and learning materials have played a significant role in this gain.

The proportion of heterosexual couple respondents who had gone to university 71 (6.0%) and other tertiary colleges 120 (10.1%) is still low. This may be due to the sieving done by examinations at the end of secondary education and the high economic requirements at the higher levels of learning. The proportion of heterosexual couple respondents who had no formal education was low 95 (8.1%), this result is in agreement with the Kenya Economic Update report that primary enrolment rates in Kenya are now almost universal (World Bank, 2013) due to the introduction of free and universal education.

D. Gender norms as a vulnerability

To determine what the society expects of men and women in relation to feminine and masculine roles, expectations and behaviour that would affect women’s and men’s access to HIV information and services, their attitude and sexual behaviour, heterosexual couples were asked questions relating to the involvement of male or female partners of a couple in decision making on sexual matters.

Regarding decision making, the heterosexual couples were asked who decides on the number of children to have in a couple. Their responses were as shown in Table 1.

Table 1: Decision maker on how many children to have and when to have them

			How many children to have and when to have them				Total
			Husband	Wife	Both	Depends	
Gender	Male	Count	390	12	106	29	537
		% within How many children to have and when to have them	45.5%	24.0%	51.5%	43.3%	45.5%
		% of Total	33.1%	1.0%	9.0%	2.5%	45.5%
	Female	Count	467	38	100	38	643
		% within How many children to have and when to have them	54.5%	76.0%	48.5%	56.7%	54.5%
		% of Total	39.6%	3.2%	8.5%	3.2%	54.5%
Total	Count	857	50	206	67	1180	
	% of Total	72.6%	4.2%	17.5%	5.7%	100.0%	

The findings in Table 1 indicate that it is the husband who has the greatest say when deciding on the number of children to have and when to have them with (857) 72.6% followed by the couple with (206) 17.5% and lastly the wife with only (50) 4.2%. Of the (857) 72.6% respondents who say the husband is the decision maker, (390) 33.1% are males and (467) 39.6% are females. Of the (50) 4.2% who say the wife is the decision maker (12) 1.0% are males and (38) 3.2% are females. Both the male and the female respondents agree that it is the husband who makes the decision with (857) 72.6% responses.

These findings confirm that the wife has minimal chance of making decision in child bearing yet biologically the woman can control child bearing given her knowledge of her menstrual cycle. The respondents were also asked who decides on when to have sexual intercourse in a couple. The responses to the question who decides on when to have sexual intercourse in a couple were shown in Table 2.

Table 2: Who decides on when to have sexual intercourse?

			When to have sexual intercourse				Total
			Husband	Wife	Both	Depends	
Gender	Male	Count	303	3	103	128	537
		% within When to have sexual intercourse	44.8%	8.3%	47.5%	51.0%	45.5%
		% of Total	25.7%	.3%	8.7%	10.8%	45.5%
	Female	Count	373	33	114	123	643
		% within When to	55.2%	91.7%	52.5%	49.0%	54.5%

		have	sexual				
		intercourse					
		% of Total	31.6%	2.8%	9.7%	10.4%	54.5%
Total	Count	676	36	217	251	1180	
	% within When to	100.0%	100.0%	100.0%	100.0%	100.0%	
	have	sexual					
	intercourse						
		% of Total	57.3%	3.1%	18.4%	21.3%	100.0%

The findings in Table 2 show that it is the husband who has the greatest say on when to have sexual intercourse with (676) 57.3%, followed by the couple with (217) 18.4% and lastly the wife with (36) 3.1%.

Of the (676) 57.3% respondents who say the husband is the decision maker, (303) 25.7% are males and (373) 31.6% are females. Of the (36) 3.1% who say the wife is the decision maker (3) 0.3% are males and (33) 2.8% are females.

Both the male and the female respondents agree that it is the husband who makes the decision on when to have sexual intercourse with (676) 57.3% of the responses. These findings confirm that the husband is the decision maker on matters of sexual intercourse. Besides, the respondents were asked who decides on when to have safer sex in a couple. Table 3 shows the results when respondents were asked who decides on when to have safer sex in a couple.

Table 3: Who decides on when to have safer sex?

			Husband	Wife	Both	Depends	Total
Gender	Male	Count	354	24	81	78	537
		% within when to have safer sex	43.9%	49.0%	42.2%	59.1%	45.5%
		% of Total	30.0%	2.0%	6.9%	6.6%	45.5%
	Female	Count	453	25	111	54	643
		% within when to have safer sex	56.1%	51.0%	57.8%	40.9%	54.5%
		% of Total	38.4%	2.1%	9.4%	4.6%	54.5%
Total	Count	807	49	192	132	1180	
	% within when to have safer sex	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	68.4%	4.1%	16.3%	11.2%	100.0%	

Sexual intercourse is said to be safer when a condom is used correctly and consistently. When asked who has the greatest say when to have safer sex, (48) 4.1% of the respondents said it is the wife, (807) 68.4% said it is the husband and (192) 16.3% said it is the couple.

Of those who say husband is the decision maker, (454) 30% are males and (453) 38% are females. When the female is the decision maker (24) 2.0% males and (25) 2.1% females are the supporters.

The findings from the study therefore show that gender equality has an impact on decision making in a couple. This was in agreement with (WHO, 2009) who cited that gender inequalities arise hindering access to treatment. Walden, (2007) also found out that in Africa due to cultural traditions and beliefs women are found to be more vulnerable to HIV infection than men, citing situation where women are culturally obliged to have sex with little option to saying no.

A Key informant had the following comments on who should have the greatest say on deciding how many children to have, when to have sexual intercourse and when to have safer sex.

It could be necessary for both partners to discuss and come up with a decision as a couple as matters touching on sexual intercourse concern the couple as a unit. Both husband and wife could equally be involved in making decisions concerning HIV infection and prevention such as condom use, family planning and being faithful to one uninfected partner. These can be discussed during couple HIV Counselling and Testing (**Source: field data, 2018**).

The findings from current research show that it is the husband who is the decision maker on sexual activities that can lead to HIV infection and prevention thus it is a husband who is the decision maker of the household. The findings also depict gender inequality which is in agreement with the report from (Mwaura, 2009) that a larger population of Kenya (52%) are women and they play an active role in the development of the society though their lives are marred by inequalities and inequities in many aspects of their life.

Naturally, women are biologically and physiologically more vulnerable to HIV infections than men (Scaccabarozzi, 2008), women also face a number of social, economic and legal disadvantages that seriously limit their ability to protect themselves against HIV infection. According NACC (2005), women economic dependence on men makes them most vulnerable to HIV infection. This limits women's ability not only to access HIV prevention services and commodities but also diminishes their decision making power.

Research has shown that most married men in Kenya have extra marital sexual relationships and women rarely have the power to go against that practice. To realize any impact, women need to be more empowered economically in order to reduce their dependence on men. Women need to be more empowered educationally as lower levels of education lead to early marriage, more years in marriage and longer years of exposure to HIV. Comparatively, higher education levels for girls is associated with a higher age of marriage, higher economic power, improved health seeking behaviour, and reduced risk of HIV infection (Grown, *et al.*, 2005).

Women could therefore be actively involved in decision making on matters pertaining to sexual intercourse and thus planning and implementing the action plan to protect the couple from HIV infection.

CONCLUSION

Gender inequality is clear with the husband being responsible for most decision making in the household

RECOMMENDATION

1. Steps should be taken to reduce the vulnerability of married women and men to HIV infection. This could include stronger policies, better prevention strategies, and changes in harmful social norms.
2. Heterosexual couples should be re-educated about societal norms which negatively impact their health. This can assist to reduce HIV infection in marriages.

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Covid-19 and the Impact on Energy Consumption: An Environmental Assessment of Ontario Canada.

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Abstract- This study examines the impact of the Corona Virus Disease 2019 (COVID-19) pandemic on Energy Consumption in relation to Human and Environmental Responses in Ontario Canada. Supply and demand of Electricity which is a secondary form of energy was extensively studied and reviewed. This impact was compared between the active COVID-19 period in the study area and similar periods of previous years. The data sets studied, reviewed and analyzed were extracted from the database of the World Bank World Development Indicator and the Independent electricity System Operator (IESO) of Ontario Canada. From the study and analyses, it was evident that: COVID-19 has disrupted many businesses, resulting in reduced provincial demand/Consumption and creating significant uncertainty in supply and demand forecasts. Demand reductions in all hours ranging from 800 – 3,000 MW, which is 6 -18% of typical demand for the similar periods/time of the year. Industrial and Commercial consumption were drastically reduced due to the closure of majority of the factories and industries as a result of the COVID-19 pandemic. This also led to the reduction in the Green House Gas and Co2 emissions in the studied period of active COVID-19, compared to similar periods of previous years. As expected, Residential and household demand experienced some increase because of the stay at home rule that was employed to manage social distancing concept for the COVID-19 period. An all-inclusive stakeholders dialogue is especially important during periods of uncertainty to ensure stable maintenance and reliable operation of the grid.

Key Words- Covid-19, Electricity Demand and Supply, Energy Consumption, Environmental Assessment, Residential Consumption,.

I. INTRODUCTION

Over the past few months, the Covid-19 pandemic has caused an extraordinary global economic and social crisis. The pandemic has significantly affected all aspects of life, including the energy sector[1-2].

Energy production and consumption remain the largest contributor of carbon dioxide emissions [3], as such, mitigation option requires measures that promote energy efficiency and the substitution of conventional energy sources with renewable energy technologies[4-5]. While the Sustainable Development Goal Seven seeks to ensure the availability and accessibility of clean and modern energy technologies [6], the underlying factors that propel energy consumption levels should not be underestimated. The energy sector has already felt the impact of Covid-19. The outbreak has contributed to a dampened demand for oil, resulting in plummeting prices and declining production, especially in the wake of the Russia-OPEC price war[2]. According to the IEA Oil Market Report – April 2020, global oil demand is expected to fall by a record 9.3 mb/d year-on-year in 2020[7]. Demand in April is estimated to be 29 mb/d lower than a year ago, down to a level last seen in 1995. Covid-19 has also accelerated the continued drop of gas prices[8].

A similar trend of falling demand and price reduction can be observed in the electricity sector. Europe has faced a record collapse in electricity prices[2]. In many European countries, power prices have turned negative. This is evidenced by the data from Nord Pool (Europe's leading power market) and HUPX (Hungarian Power Exchange) regarding prices in the day-ahead market. Such a situation is considered normal in some countries during weekends or holidays, but now negative figures are also fixed on weekdays.

Study Area

Ontario is one of the thirteen provinces and territories of Canada[9]. Located in Central Canada, it is Canada's most populous province, with 38.3 percent of the country's population, and is the second-largest province in total area. Ontario is the fourth-largest jurisdiction in total area when the territories of the Northwest Territories and Nunavut are included[10]. It is home to the nation's capital city, Ottawa, and the nation's most populous city, Toronto, which is also Ontario's provincial capital.

Ontario is bordered by the province of Manitoba to the west, Hudson Bay and James Bay to the north, and Quebec to the east and northeast, and to the south by the U.S. states of (from west to east) Minnesota, Michigan, Ohio, Pennsylvania, and New York.



Figure 1: Map of Ontario showing cities and regions.

Almost all of Ontario's 2,700 km (1,678 mi) border with the United States follows inland waterways: from the westerly Lake of the Woods, eastward along the major rivers and lakes of the Great Lakes/Saint Lawrence River drainage system. These include Rainy River, Pigeon River, Lake Superior, St. Mary's River, Lake Huron, St. Clair River, Lake St. Clair, Detroit River, Lake Erie, Niagara River, Lake Ontario and the St. Lawrence River from Kingston, to the Quebec boundary just east of Cornwall. There is only about 1 km (0.6 mi) of land border, made up of portages including Height of Land Portage on the Minnesota border[9].

Ontario is sometimes conceptually divided into two regions, Northern Ontario and Southern Ontario. The great majority of Ontario's population and arable land is in the south. In contrast, the larger, northern part of Ontario is sparsely populated with cold winters and heavy forestation. Each year, more than half of Canada's immigrants choose to settle in Ontario, the most populous and most centrally located of the country's provinces. A quarter of Ontario's nearly 13 million residents and almost half of the population of its provincial capital, Toronto, were born outside of Canada. Ontario is also the first stop for many of Canada's tourists, not only for its big city attractions, but also for the natural beauty found in its vast wilderness[10]. The Western Hemisphere's highest free-standing structure, the 1,815-foot CN Tower, soars high above the skyline of Toronto. Toronto is Ontario's provincial capital, Canada's most populous city, and one of the most multicultural communities on Earth. On clear days, visitors can see 75 miles away to another famous Ontario attraction, Niagara Falls, from the CN Tower's Sky Pod

observation deck. Canada's national capital, Ottawa, lies 250 miles north of Toronto. Ottawa's Rideau Canal, one of Ontario's most popular boating sites in summer, freezes into the world's longest outdoor ice-skating rink once winter arrives[9].

Co2 and Greenhouse Gas Emission

The determination of factors affecting energy consumption and economic growth has been a topical subject of many studies, since the 1970s[11]. However, the existing evidence on the nexus between economic growth and energy consumption has been inconclusive[5]. Yet, an understanding of the determinants of energy consumption and its modeling in emerging economies is important. A detailed knowledge about energy consumption is becoming increasingly relevant, with the aim of saving costs, and reducing greenhouse gas emissions, because energy reduction is an environmental and economic challenge[12]. Between, energy consumption and economic growth have been found to be very complex due to prevailing factors, because energy is a key component of economic and social progress[13]. At the same time, the provision of energy often conflicts with sustainable development because energy production consumes resources and degrades the environment. Key trade-offs associated with energy consumption and its distribution arise from footprints on the environment, which is why an integrative, cross-sectoral approach to energy consumption is essential[12].

There is widespread agreement among energy economists and policy analysts in Canada and elsewhere that the ever-increasing energy demand is the major contributing factor to anthropogenic greenhouse gas emissions[2,5,11]. Energy is essential to all economic activities, however, the increasing attention given to global warming and climate change has renewed spur to research interest in the relationship between the environment, energy consumption, and economic growth. Nowadays, mitigation assessment of greenhouse gas emissions has become an integral part of the national and international climate policy agenda. However, to curb the greenhouse gas emissions and to ensure the sustainability of the economic development, it is important to better understand the link between greenhouse gas emissions, energy consumption, and economic growth[14]. In particular, increased energy consumption is frequently identified as a serious environmental impact. It is therefore extremely important to consider this impact because energy saving is intimately connected with countermeasures against global warming[15]. In fact, many evaluations have already been conducted on energy demand and consumption[16].

The remainder of the paper is organized as follows. The next section gives a brief review of the existing literature. Section 3 describes the data and methodology used in the study. The analyzed data are presented and discussed in Section 4. And section 5 concludes the paper.

II. LITERATURE REVIEW

The energy sector has already felt the impact of Covid-19[11]. The outbreak has contributed to a dampened demand for oil and conventional fossil fuel energy sources, resulting in reducing prices and declining production, especially in the wake of the Russia-OPEC price war. According to the IEA Oil Market

Report – April 2020, global oil demand is expected to fall by a record 9.3 mb/d year-on-year in 2020. Demand in April is estimated to be 29 mb/d lower than a year ago, down to a level last seen in 1995[1,11]. Covid-19 has also accelerated the continued drop of gas prices.

A similar trend of falling demand and price reduction can be observed in the electricity sector [17]. Europe has faced a record collapse in electricity prices. In many European countries, power prices have turned negative. This is evidenced by the data from Nord Pool (Europe's leading power market) and HUPX (Hungarian Power Exchange) regarding prices in the day-ahead market. Such a situation is considered normal in some countries during weekends or holidays, but now negative figures are also fixed on weekdays.

Unsurprisingly, the strictness of confinement measures correlates with drops in consumption: 25% in Italy, 20% in France, 12% in the United Kingdom. Another concern is the impact of the reduced demand on utility companies' cash flows and the spillover effect this has on the energy sector[18]. Some of the other effects of COVID-19 on the Energy sector and Consumption are discussed below.

Construction of New Energy Facilities and Infrastructure Delayed or Stopped

Many companies across different sectors globally have ceased or decreased capital expenditures where possible, and the energy sector is no exception[11]. For example, Distribution System Operators (DSOs) are delaying most initiated projects, resulting in a substantial decrease in the procurement of goods and services[19]. Non-critical investments have been suspended. The fulfillment of investment programs by Transmission System Operators (TSOs) and DSOs is also at risk.

Covid-19 is having an especially negative impact on the renewables sector. One of the main problems relates to the delivery of equipment to power plants. China, which is among the countries most heavily affected by the coronavirus, is the main global producer of many clean energy technologies, such as solar panels, wind turbines and batteries[20-21]. Since coronavirus has delayed deliveries from China, renewable energy companies are not able to comply with deadlines for equipment installation. For instance, in India alone 3,000 MW of solar and wind energy projects face delays, due to the coronavirus lockdown[22]. BYD, the world's leading producer of rechargeable batteries, was unable to complete tests of new models of rechargeable batteries due to the pandemic, and this has led to a reduction in delivery volumes of rechargeable batteries for the European market [23].

Default of Payment

In many countries (including all but two Contracting Parties of the Energy Community), customers have been advised by energy regulators and governments to delay the payment of utility bills. Defaults on payments cause cascade effect and impact the whole sector[11]. Although there is widespread tolerance of non-payment by end-users, policymakers did not explicitly define if

leniency towards non-payment would be applied further along the supply chain (to DSOs, TSOs, suppliers and producers). So far, none of the Contracting Parties of the Energy Community have explicitly defined who will bear the costs of financing this debt[18].

The waiving of interest and bans on disconnection will most likely increase costs for DSOs. Consequently, their revenues will be decreased and, if the crisis continues, their financial status will deteriorate. It is inevitable that all this would negatively impact the cash flow and short-term liquidity of DSOs. A lack of working capital to finance short-term liabilities for regular operation is expected within two to three months if the situation persists[2,11].

Response of Policymakers, Regulators, and Market Participants

Countries around the world are taking steps to support the energy sector and to mitigate the negative effects of the crisis[11]. There are myriad challenges that policy makers, regulators, TSOs and DSOs need to address to ensure energy security.

Europe's energy regulators have already taken special measures to ensure a safe and reliable energy supply by guaranteeing essential services such as gas, heating and power, as well as measures aimed to ease financial requirements on consumers who face economic difficulties during lock down (bill-paying measures for vulnerable consumers to avoid disconnections)[24].

In some countries, certain measures have also been taken to support the renewables sector. For instance, Poland's government has developed a draft of the so-called Anti-Crisis Shield Act, which provides the President of the Energy Regulatory Authority with the right to extend deadlines for renewable energy producers for commencement of sales within the auction system[25].

DSOs have implemented a number of organizational measures related to the safety of personnel, ensuring maintenance activities, securing supplies, etc. The security and safety of dispatch centers is ensured by means of: isolated teams in dispatch centers with back-up teams in isolation on stand-by; restricted access to dispatch centers and to stand-by units; and standby teams composed of retired staff, in order to maintain the safety and prevent the exhaustion of key staff, and address the issue of the lack of qualified and trained key staff[26].

Regular maintenance activities and field work are restricted to a minimum, with repair and restoration being prioritized. Planned interruptions for regular maintenance are either suspended, postponed, or implemented with a limited duration. Mobile intervention teams have been established as a back-up for field units. The quality of service, however, may be at risk if planned repairs and maintenance works are postponed for too long. According to the document summarizing issues of concern based on ongoing discussions held on April 21, 2020, DSOs reported that current supplies of vital spare parts, tools and equipment are sufficient for repairs and urgent remedial maintenance; some

DSOs have a central warehouse or a centrally managed stock system, enabling more efficient use of available vital spare parts, materials, tools and equipment. Nevertheless, should the crisis continue, there is a risk to network and staff safety if supplies are not replenished in time[18].

As was rightly pointed by the International Energy Agency, the sharp decline of the oil market may put clean energy transitions at risk by reducing the impetus for energy efficiency policies [27-29]. Without measures by governments, cheaper energy always leads consumers to use it less efficiently. It reduces the appeal of buying more efficient cars or retrofitting buildings to save energy. Thus, policymakers should keep the “green” agenda in mind.

Covid-19 has drastically impacted energy sector across the globe. The whole range of consequences for the energy sector is yet to be revealed and is difficult to predict, however it is already clear that demand for energy resources has dropped, prices have plummeted and non-payment of utilities bills by end-consumers will have a detrimental effect along the supply chain (DSOs, TSOs, suppliers and producers)[11]. Notwithstanding, the “green” agenda should not slip away from the list of national policymakers’ and regulators’ priorities. Although there are numerous empirical studies that have contributed to the discussion and understanding on energy–growth nexus. Yet, there appears to be no consensus concerning the direction of causality between energy consumption and economic growth[30-31].

The general observation that emerges from various existing literature is that most studies on the energy–environment–growth dynamics have employed aggregated level data that led to conflicting results[5]. As pointed out, disaggregate level data may provide further insight regarding the link between output growth, energy consumption and environmental degradation. Thus, we feel the usage of disaggregated data may elicit the correct diagnosis of energy environment growth nexus[31-33]. Energy has a crucial role to play in a global development context. The potential for energy to improve living standards, whether through the freeing of time from household chores (for example, washing clothes or cooking); increased productivity; improved healthcare and education services; or digital connections to local, regional and global networks can never be overemphasized[34].

The link between energy consumption and economic growth has been a topic of wide discussion. A large number of studies have attempted to derive the causal relationship between energy consumption and economic growth, however no clear consensus has emerged[35]. This can be partly attributed to the fact that the link between energy and prosperity is not always unidirectional. Gaining access to electricity and other energy sources may provide an initial increase in GDP, but having higher GDP may in turn drive higher energy consumption. Additionally, progress in development outcomes can be complex: a number of parameters may be improving at the same time. If, for example, energy access and consumption, nutrition, education, health, and sanitation are all improving simultaneously (and having complex relationships with one another), it can be hard to directly attribute

improvement in living standards back to a single parameter[5].

Home electricity use is up in Ontario and Quebec since the start of the pandemic even as overall consumption rates have gone down, according to hydro utilities in the two provinces[18]. According to Hydro-Québec, the province's residential electricity consumption between March and July 2020 was 4.27 per cent higher than during the same time last year. In Ontario, meanwhile, the Independent Electricity System Operator said consumption increased by 15 per cent. Despite the overall provincial increases, certain regions reported differences in residential usage: Hydro Ottawa, for example, said via email that residential electricity consumption in Canada's capital increased by approximately four per cent.

In contrast, residents of Quebec's Outaouais region increased their consumption by seven per cent[2]. The numbers aren't surprising because the region's largest industry is government services. governments have closed completely, So the government employees continue to work from home. This leads to a much higher use of computer equipment at home. Despite the rise in residential electricity use between mid-March and the end of July, energy companies say they're seeing consumption go down overall. In Quebec, consumption across all sectors decreased by 5.04 per cent compared to the same period last year. Ontario saw usage plummet between 10 per cent and 12 per cent. The overall decrease is mainly due to stagnation brought on by shuttered or slowed economies, and that translates into energy companies bringing in less income from their commercial and industrial customers. Less income means less profit, and Less profit means less dividends paid to the shareholder and, in this case, the shareholder is the government.

The effects of social distancing guidelines are likely to continue affecting electricity consumption during the next few months[2]. It is expected that retail sales of electricity in the commercial sector will fall by 6.5% in 2020 because many businesses have closed and many people are working from home. Similarly, industrial retail sales of electricity are projected to fall by 6.5% in 2020 as many factories cut back production. Total U.S. electric power sector generation is projected to decline by 5% in 2020. Most of the expected decline in electricity supply is reflected in lower fossil fuel generation, especially at coal-fired power plants. After decreasing by 2.8% in 2019, EIA forecasts that U.S. energy-related carbon dioxide (CO₂) emissions will decrease by 11% in 2020. This record decline is the result of restrictions on business and travel activity and slowing economic growth related to COVID-19.

Huge Emissions Reductions

Carbon dioxide emissions are down across the globe, most significantly in places where industries are shuttering[9,36]. The Centre for Research on Energy and Clean Air reported the lockdown in China cut the country's carbon emissions by 25 per cent, or 200 megatons of CO₂, because of a reduction in things like coal burning, oil refining and airline traffic[36]. Though it is not certain if these declines will be permanent, as those same activities will be back online once the pandemic passes.

Much of that production will ramp back up double time. So, the net emission reduction will not be known until well after the fact. And it's likely to not be nearly as big as what we're seeing right now.

Emission reductions from personal choices are less significant. However, there are still lessons to be learned, including the importance of pushing industry toward clean energy sources.

It has been said that climate change is affecting influenza in general. And of course, this is a form of influenza, it's making our seasons longer, which gives the viruses more time to mutate. As climate changes too, in a warmer world, there's some indication that our immune system might become less robust so we're more likely to get it. Studies from during the SARS outbreak in 2003 that showed air pollution made people more vulnerable to viruses. It was found that people who lived in polluted areas who were infected were twice as likely to die from it as people who lived in areas that were not polluted. So our actions have consequences and what this is highlighting is that our choices matter in every aspect of our lives[37-39].

However, climate change isn't solely to blame for this pandemic. Diseases spread by vectors such as ticks, and mosquitoes do get worse because climate change increases their range northward. COVID-19, however, is spread by humans, and our range isn't limited by climate. Measures taken to fight the COVID-19 pandemic have cut worldwide greenhouse gas emissions by 17 per cent, says newly published research[40]. Behavior change on its own can only do so much, You really need to have structural change.

Figures for emissions of greenhouse gases aren't normally available until after emitters have reported them. In this case, researchers used a variety of proxies to estimate releases of carbon dioxide and other climate-change-causing gases as countries brought in stiff measures to restrict individual movement and activity. Tech companies such as Apple provided data. The aviation industry offered flight information. Electric utilities gave figures on generation and consumption[2].

Electricity Consumption and Demand

In the last week of March, electricity consumption in Ontario was the lowest in 15 years according to eMerge, a local non-profit that promotes renewable energy to reduce the effects of climate change[18].

The organization is projecting a continued decline as the lockdown remains in place during the COVID-19 pandemic.

“We seem to be settling into a new normal, and that new normal is significantly lower consumption,” said executive director of eMerge, Evan Ferrari. Every day, we review data from The Independent Electricity System Operation (IESO), which includes residential and commercial energy usage in Ontario including bio fuel, solar, wind, gas, hydro and nuclear. We collect the data and organize it into a chart that compares levels

from 2005-2020 and takes into account variables like changing weather, holidays and peak times. Ferrari has noticed a steep decline in provincial consumption levels since March 22 – the day before Premier Doug Ford announced the provincial lockdown.

Socioeconomics are not that different from the average in Ontario, so we suspect that our curves are looking pretty similar, he said, adding that local information isn't readily available online but that eMerge will continue to update their blog regularly with relevant information.

Similar patterns have emerged across the country and around the world as the mandatory closure of non-essential businesses and industries has forced many people to stay at home and practice physical distancing. Hydro-Quebec says residential consumption is up two per cent and commercial consumption is down three per cent. In British Columbia, the province's hydro provider reported business and residential consumption dropped by 15 and 13 per cent respectively.

The drop in demand is also reflected in lower prices. On March 24, HydroOne announced that it would temporarily reduce pricing to an off-peak flat rate for 45 days. Ferrari says that while this is a welcome financial relief for many people currently out of work, he still recommends reducing energy-intensive activities during peak hours. If everyone is doing their laundry, dishwashing, and cooking at exactly the same time ... our CO2 emissions go through the roof. From a climate change perspective, we call it peak shaving. If we can shift the use of electricity away from that peak, we reduce the fossil fuel that's burned[18].”

Ferrari believes eMerge has an important role to play in ensuring climate change is part of the conversation surrounding COVID-19. The organization hosts public programs to promote energy-efficient practices as well as home visits to advise on ways to reduce energy consumption, but Ferrari says they are making the switch to virtual home visits and phone consultations.

“We're hoping we can provide people with other opportunities to save money at this time by reducing energy in different ways and reducing their impacts on climate change.” Looking ahead, Ferrari says he's cautiously optimistic that the COVID-19 pandemic could mean a shift towards a more energy efficient world. COVID-19 demands a massive international approach and many countries in the world are profoundly impacted by it. The biggest impact envisaged is that people will take that same vigor and approach fighting climate change[20,41-42].

III. METHODOLOGY

To conduct an assessment of energy consumption in Ontario Canada, this study employs data from the database of the World Bank World Development Indicator and the Independent electricity System Operator (IESO) of Ontario Canada. data variables that are used Include; GHG and Co2 emission rates, Energy consumption, Electricity demand, supply and consumption, Industrial Electricity consumption, commercial Electricity consumption, Residential and household Electricity consumption, Daily Energy use, Peak demand hours, Overnight lows. among others.

The Data were intensely analyzed and discussed, and conclusions inferred.

IV. RESULTS AND DISCUSSIONS

This section is based on findings derived from data obtained from the World Bank World Development Indicator and the Independent electricity System Operator (IESO) of Ontario Canada.

It was evident that there was a significant reduction in Electricity demand in all hours ranging from 800 – 3,000 MW, which is 6 - 18% of typical demand for this time/period of year.

Peak period demand was reduced by approximately 10-15%. The overall energy consumption to date continues to be approximately 10-12% lower than normal while Demand is expected to continue to decrease through April and May when warmer weather materializes.

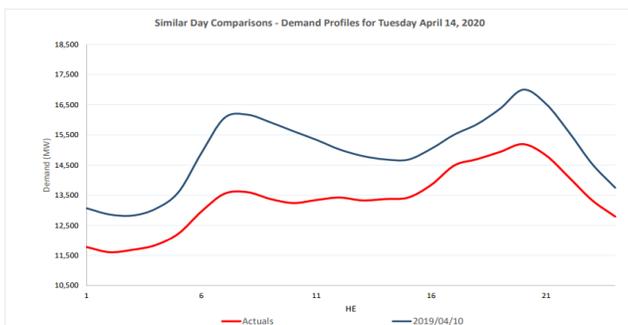


Figure 2: Demand for energy during the the COVID-19

From **Figure 2** above, it was clearly evident that there was a significant and visible difference between the demand for energy during the the COVID-19 period, and the demand for energy a year ago in the same period of time. This shows a definite impact of COVID-19 on demand for Energy.

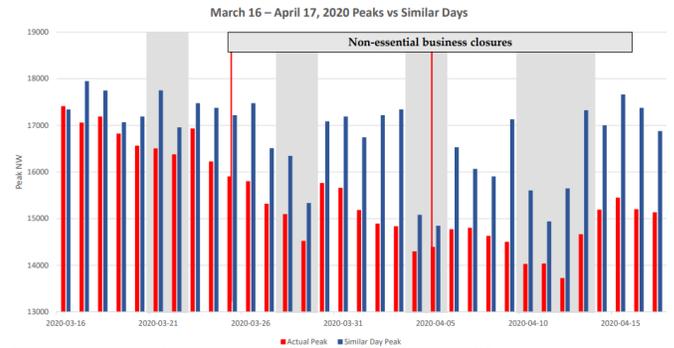


Figure 3: Peak demand on an electrical grid

A peak demand on an electrical grid is the highest electrical power demand that has occurred over a specified time period. It could be calculated annually, daily or seasonally. In **Figure 3**, the peak demand during COVID-19 period was compared with similar days, and the data obtained shows that Peak Demand was down by 10-15%. This further reiterates that COVID-19 has some impact on energy consumption.

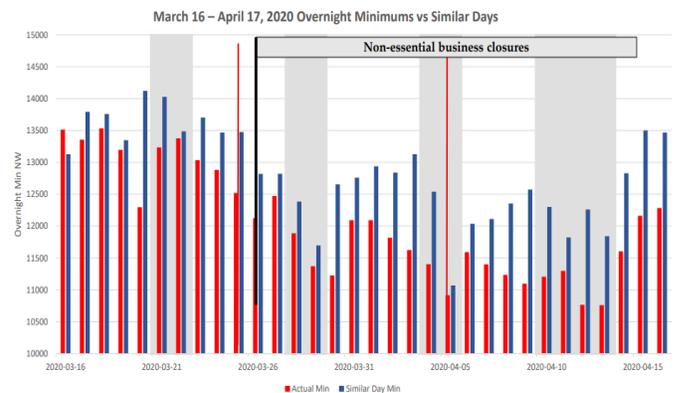


Figure 4: Overnight lows of electricity consumption

Another impact of COVID-19 on power consumption is found in the comparison of the Overnight lows of Electricity consumption during the active period of COVID-19 versus similar day in same period of the year as depicted in **Figure 4**, the Overnight lows came down to between 9-13%.

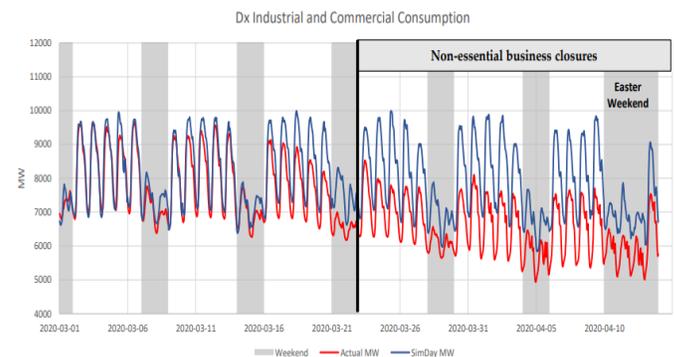


Figure 5: Industrial/Commercial energy consumption

Figure 5 shows in clear terms plummeting Industrial and Commercial consumption compared against similar days, this was more evident after the closure of the non-essential businesses as a measure to control the spread of COVID-19.

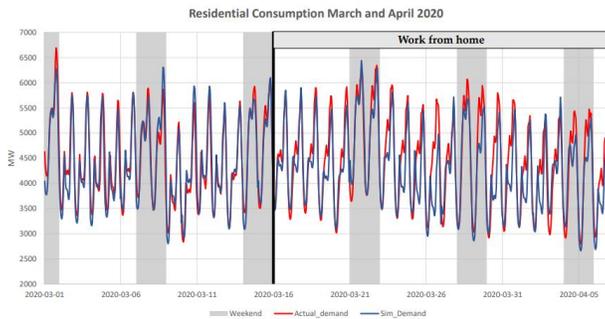


Figure 6: Residential consumption

On the contrary, residential consumption recorded some increase when compared to similar days. This is as a result of the stay at home and the social distancing policies being implemented across the entire province of Ontario. The data in **figure 6** is clear about this. It also shows that there is a clear relationship between staying at home, and residential electricity demand and consumption.

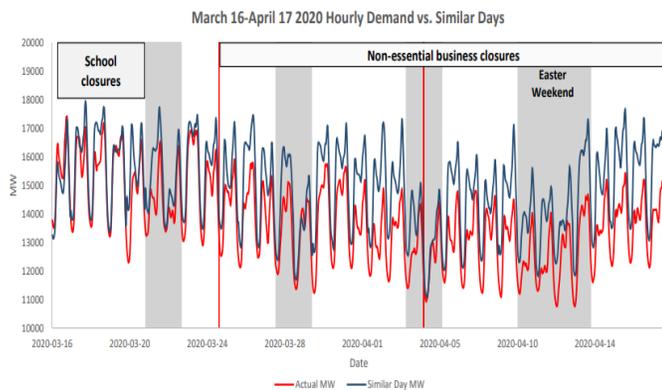


Figure 7: Overall electricity demand

Overall electricity demand in Ontario is being considered in **Figure 7**, data collected across all sectors of the economy shows an overall decrease in demand for energy and because of the closure of most industries and factories except essential service providers. This singular act has greatly affected overall Electricity demand and consumption in Ontario.

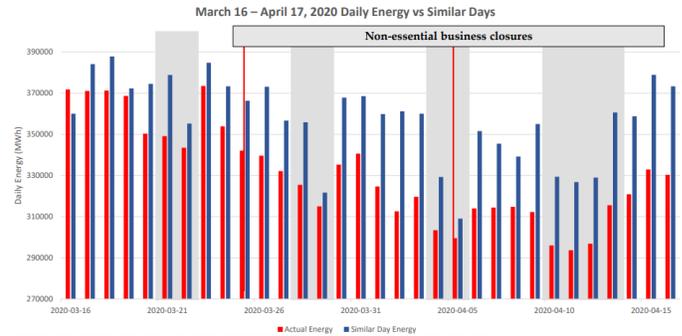


Figure 8: Ontario's energy use

As compared to similar days in previous years, in **Figure 8**, Ontario's energy use was seen to decrease between 10-12%. This further shows the impact of COVID-19 on energy use as compared to similar days.

V. CONCLUSION

As observed, Ontario's electricity system is reliable, with enough supply available to meet demand under a variety of risk scenarios, however the IESO and stakeholders have been limiting staff on-site, deferring non-essential work, and focusing on core operations for the special period.

Dialogue between and amongst stakeholders is especially important during periods of uncertainty to ensure optimal operational maintenance.

From the analyses and comparison of data from previous and present year, High surplus baseload generation (SBG) conditions are often observed in the spring when demand is low and there are large amounts of energy from hydroelectric resources caused by higher water levels

The IESO continues to update its assessment of SBG conditions and SBG management options through spring/early summer.

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The Effect Of Leadership Style, Determination Of Strategic Change On Implementation In Telecommunication Companies In Kenya

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Abstract- The telecommunication companies over the globe are growing very fast and this has been attributed to the strategic planning and implementation of growth strategies. Despite the industry experiencing a boom in the recent past, only a handful of scholarly studies have been conducted in Kenya to capture these growth moments and make sense of them. The key determinants for success of implementation of strategic plan are the government policies, leadership style, marketing positioning and the organizational structure among others. Essentially, the study sought to bring out the how these determinants predict the implementation of strategic change with focus on telecommunication entities in Kenyan context. The study targeted 562 senior managers of the three main telecommunication players in the Country namely Safaricom, Airtel, and Telekom Kenya. Approximately 234 managers from the three companies were sampled and a questionnaire that had been pretested and validity and reliability tested were administered. Data collected was entered into a spread sheet, cleaned and then analyzed. Descriptive data analysis was conducted and results given in tables and figures. Inferential statistics were calculated using SPSS version 22 to calculate the correlation and regression analysis for drawing of inferences. A statistically significant link of government policy, market positioning, leadership style and organizational structure on implementation of strategic change in Telecommunication Companies in Kenya was noted. It was recommended that telecommunication companies to consider government involvement in commercial activities enhance market positioning practices and ensure strategic structure alignment is enhanced to have an effective strategic change implementation.

Index Terms- Leadership style, Strategic change and implementation

I. INTRODUCTION

Globally, the telecommunication industry has been developing anonymously in the past three decades. Within this period the extent of people who have been getting to telecom industry has also been on the rise. Various people have had the choice to get to cell phones, broadband and fixed phone lines. In this manner, various countries are setting resources into the business as a methodology for pushing cash related development (Caroline, 2016). China and India are among the best and speediest making economies on earth today, which offer some strategic standard parts. The telecom business is an interesting industry to consider,

not by virtue of its irregular nature to the degree mechanical advance and its strategies, yet in like way in setting on the high progress pace of this industry all through late decades and the titanic responsibility of the business to the economies of these countries. China is immediate the world's most huge telecom pitches and as appeared by specialists' figures, there are more than 1.25 million cell supporters joining each week (Pyramid, 2015). In the meantime, India has changed into the strongest making telecom markets with a common improvement pace of over 26% and passed on business open entryways for around 10 million people.

Strategy implementation as indicated by Gabriel and Kazanjian (2016) includes the improvement of structures and strategies in an organization. Implementation on the other hand is a strategic stage and in the strategy that cannot be directionless anyway as a rule ignored. In addition, consequently being a determinant of implementation, there is having to define strategies that could trigger more prominent performance when viably actualized. Strategic arranging and performance should join depictions of the various models that could show the organizations characteristics which will enable the implementation to gathering to make effective strategies for implementation.

II. PAST STUDIES

Leadership Style

Musyoka (2017) looked at the styles of leadership and their link with implementation of strategies with a focus on the hotel sector. The specific focus if the study was on Safari Park Hotel. The adopted design was descriptive and 59 staff were targeted and censured. It was shown that transformational, democratic and charismatic styles of leadership were all applied at the Safari Park Hotel. It was indicated that existence of good channels of communication enhances the implementation of strategies. The issues and concerns raised include the need to have in place clear channels of communication between the management team and the staff in the organization.

Inyang, Agnihotri and Munoz (2018) looked at the style of leadership of the manager and the role it plays as far as the implementation of the sales strategy in the entity is concerned. The study covered a total of 190 respondents and it included development and testing of hypotheses. It was shown that transformation style of leadership and the implementation of strategies are linked with each other. Furthermore, it was shown that the implementation of the strategy for sales directly predict

performance of sales. The implications that were raised from the inquiry included the fact that the sales managers are required to ensure that their style of leadership has been adapted on the competitive environment which they carry out their operations.

Tawse (2018) did an inquiry into the style of leadership where the subjects are involved to participate in the activities and how this boosts the need to ensure that strategies have been actualized. Besides actualization of the strategies formulated as one of the variables. The other variable was the ability of the firm to perform. The context of the inquiry was in United States of America. Among the constructs that were considered by the inquiry include the structure of the entity, the degree of involvement and the success in actualization of the strategies formulated. It was shared that having a culture where participants are involved in the activities of the actualization of the strategies boosts the degree of success.

Koech and Namusunge (2012) did an inquiry into the styles of leadership and their link with the ability of the firm to perform. The key area of concern in the inquiry was on corporations in the public domain covering the county of Mombasa. The constructs adopted in the inquiry included transformation and autocratic style of leadership. It was shown that free reign and the ability of the firm to perform are not linked with each other in significant terms. Anita, Wachira and Mwendas (2015) concentrated on the smaller firms with operations in Nairobi and looked at the style of a leader and its link with the ability of the firm to implement its strategic plan. The design used was descriptive. In total, 354 entities were covered by the inquiry. The key constructs of the style of leadership examined by the investigation include the ability to supervise, responsibility of the manager to the activities of the entity and the ability to exercise discipline. A positive link was noted between autocratic style of leadership and the ability of the firm to implement strategies. In agreement with these views, Murigi (2013) did an inquiry into autocratic style of leadership and the role it plays in ability of the entity to perform. It was shared that autocratic style of leadership covers the ability to exercise discipline, supervise and command. Thus, the key emphasis of the leader with autocratic attributes is to ensure that the key tasks in the entity have been completed as planned.

Ngetich and Maina (2014) did an inquiry into the style of leadership and the link with implementation of strategies. The key styles of leadership that were covered in the inquiry include participative, autocratic, free reign and democratic styles. In total, 320 staff targeted from senior positions was targeted in the inquiry. The focus of the inquiry was on KRA and it was shown that autocratic leadership Style has positive relationship on strategy implementation at KRA.

Allameh (2015) did an undertaking on the styles of leading and the actualization of the strategies in the Iranian context. It was shared that the style of leading adopted in the entity goes a long way to ensuring that the strategies formulated have been actualized. Ghamrawi (2013) undertook to bring out the link between the style of leadership and the ability to actualize ICRT activities in the learning institutional context. It was noted that an entity having managers who are autocratic will have its strategies adversely affected at the actualization phase.

Awino (2017) did an inquiry into identified variables and their link with the ability of the body corporate to perform. The scope of the inquiry was on relatively larger manufacturing

entities in Kenyan context. The adopted design was descriptive also including the use of surveys. These were meant to bring out the link between variables. Views were gathered as supported by first hand as well as auxiliary sources. It was found out that it is only good leadership which can ensure effective implementation of strategies. Awino (2017) further urged that the top management led by the CEO, must commit everything for strategy implementation to be a success, and this includes involving all members from staff.

Ndungu (2014) studied the job of a leaders with strategic considerations and change at the Kenya Wildlife Service. The study used a graphic research plan and essential data was gathered utilizing a semi-organized survey. The study found that strategic leadership affected implementation of progress the board rehearses at the Kenya Wildlife Service. It is of importance for the leaders in the entity to ensure that various resources have been availed and that the vision of the entity has been shared to all other the staff. At the same time, the leaders should be dedicated to the need to actualize the strategies while buying all the new issues that are so diverse. The direct link between actualization of the change in the strategic dimension and the style of the leader is also supported by Bhargara (2013) who noted that when the management of the firm is effective, the change initiatives from a strategic angle are also strengthened.

Murigi (2013) was keen to bring out the leadership traits of the school head and how they predict the ability of learners to perform. The scope and focus of the inquiry was on Muranga. The key emphasis of the inquiry was on autocratic style of leadership with its measures covering the ability to supervise, direct, arrange tasks and instill discipline. It was noted that that individual who lead autocratically largely place emphasis on their roles as managers (mean =4.9) and getting things done (mean=4.2). It was shown through the leadership of autocratic style; the staffs are motivated as the leader provides discipline to students. Surprisingly, this autocratic style of leadership was seen to have least link on performance of the learners.

Michira and Anyieni (2018) focused on leadership and the role it plays as far as the implementation of strategic plans is concerned. The specific reference of the study was on Mwalimu SACCO. The upper echelon provided anchorage to the inquiry and the adopted design was survey. Leveraging on information gathered from primary sources, it was noted that the style of the leader will directly boost the ability of the organization to implement the strategic plans. Among the styles of leadership noted to have been adopted in the firm include democratic, transactional and transformational. However, there were some managers who practiced autocratic style of leadership. From the above review, the findings portray that strategic leadership assume a significant job in predicting the degree which an entity actualizes the tactics. The sort of style of leading, correspondence approach and organizational assets profoundly shape the ability of the tactics to perform in an entity. Despite the fact that broad research has been done because of strategic leadership on approach implementation, restricted focus has been laid on telecommunication companies in the country. This study endeavors along these lines, to connect this hole by deciding the relationship between implementation of strategic change and performance of telecommunication companies in Kenya.

III. METHODOLOGY

A Research Design

The adopted design in this inquiry was descriptive. It was through this design that it was possible for the inquiry to provide a summary of information on the respondents. Through this descriptive design, it is possible for an investigation to provide a narration on the way things are in their present state

B Target Population

Target population describes the items and events that form the basis for generalization of the evidence sought in the inquiry (Burns, 2010). The researcher should strive to find out a possible element about the study population which includes age, gender and classes of the population. The inquiry targeted 562 senior managers in the three telecommunication companies in Kenya as shown in table 3.1 where the study was based at the Safaricom, Airtel and Telkom Company.

Table 3.1: Target Population

Company	Population
Safaricom Ltd	386
Airtel	73
Telecom	103
Total	562

Source: HR depts in Safaricom, Airtel and Telecom, (2019)

C Sample and Sampling Technique

The sampling was done using the stratified random sampling design. The stratified method was used in this study because the population had several managerial levels which were used as strata. Random sampling was then used to select a sufficient number of subjects from each stratum by picking the respondents randomly.

A total population of 562 management staff at Safaricom, Airtel and Telkom Company was used. Yamane (1967:886) came up with a sample size selection formula which was used in this study. $n = \frac{N}{1 + N(e)^2}$

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{562}{1 + 562(0.05)^2}$$

$$n = \frac{562}{1 + 562(0.0025)}$$

$$n = \frac{562}{1 + 1.405}$$

$$n = \frac{562}{2.405}$$

$$n = 234$$

D Data Collection Instruments

The views in response to the research questions in this investigation were gathered from first hand sources. In essence, the questionnaires were adopted. Most of the items on the tools required fixed responses from the participants in the inquiry. This was meant to give easier time to the team charged with processing these views into meaningful insights (Mugenda & Mugenda, 2012). There were different sections that were included in the tool of gathering the opinions of the participants. In first area, the key details of the participants were capture while the other areas covered information on the study objectives. Some of the items on the questionnaire was rated on a Likert system. This was meant to ease the entire process of analysis of the views of the respondents.

In administering the tools to the participants, efforts were made to ensure that each of them has been given adequate time to ponder about the items raised. This meant administering the items and then picking them at a later date. The details of the participants were captured and follows ups were made to ensure each of the item had been filled. This also gave the researcher ample time to respond to any concerns being faced by the participants in the inquiry as they capture their views on the tools.

IV. RESULTS AND DISCUSSION

A Demographic information

The study findings show that female respondents were 29.29 % while the male respondents were 60.71% of the 168 respondents who participated in the study. It shows that there are more males than females in the three management levels in telecommunication companies in Kenya. The findings show that the age of 30-34 years constituted 45.5 % of the participants in the inquiry. Those in the age of bracket 35-39 years were 25.6% while below 30 years were 12.5 %. Those in age bracket between 40 and 44 years were 8.90%. The findings imply that majority of managers in the three management levels are above 35years of age.

B Descriptive Analysis

The descriptive processing of the views of the participants on the independent variables (government policy, market positioning, leadership style and organizational structure) and dependent variable (strategic change implementation) of the study are documented in this section.

Leadership Style and Strategic Change Implementation

Leadership style was one of the study variables and Table 4.10 reports the descriptive statistics.

Table 1 : Influence of leadership style on strategic Change implementation

	5	4	3	2	1
	%		%	%	%
Level in the company in which management and control of the strategic change implementation process occur	37.4	39.3	12.5	6.3	4.5
Level of involvement by people/departments are in guiding the strategic change implementation process	32.7	42.3	7.2	12.6	5.2
Management regularly updates employees about the plans and progress toward the change implementation.	31.6	37.8	16.4	9.3	4.9
Leadership style which led to the most effective implementation of strategic change in your company	30.9	39.3	8.9	14.2	6.7

Source: Research Data (2020)

In regard to the level in the company in which management and control of the strategic change implementation process occurs respondent were asked to indicate their responses using nominal codes of 1-5 where ;5= top level, 4= Middle Level, 3= Functional Level, 2=Others and 1= Impossible to tell. 37.4% of the respondents indicated top level, 39.3% middle level, 12.5% functional level, 6.3% other levels and 4.5% indicated it was impossible to tell which level the telecommunication company strategic implementation process occurred. Respondents were asked state whether the management regularly updated employees about the plans as well as progress made towards realization of change in strategic view in the telecommunication company, 31.6% of the participants in the inquiry were in strong agreement, 37.8% agreed, 16.4% indicated neutral, 9.3% disagreed and 4.9 strongly disagreed. In regard to the leadership style which enhanced the effectiveness of implementing change from a strategic point, respondents were asked to indicated with nominal codes 1-5 where 5= Authoritarian, 4= Democratic, 3=Laissez Faire, 2= Bureaucratic and 1= Neurocratic. 30.9% of the respondents indicated authoritative, 39, 3% democratic, 8.9% laissez faire, 14.2% bureaucratic and 6.7% indicated neurocratic leader

from strategic point of concern has been actualized in an entity. The area of emphasis of the investigation was entities carrying out activities in the telecommunication segment of the Kenya. It was shown one of the adopted styles of leadership was democratic b and it was characterized by high level of communication. The major finding on leadership styles was that a democratic leader is one who is able to communicate well and this is among the style of leadership that are highly desired. Middle level employees' ability to engage in decision making process was fundamental to such leadership in telecommunication companies having a significant influence in the implementation of strategic change. It is important to ensure that the senior managers have been involved in the implementation of strategic issues in the entity. This will give the senior managers an opportunity to collaborate and work together with other staff for the sake of attainment of the key goals of the entity. Bhargara (2013) noted that well-functioning managerial units ensure that their strategic considerations have been strengthened while enriching the tasks and activities of other staff in the entity. It can therefore be shown that the structure of the entity is among the determinants when the firm is striving to implement change in the strategic dimension.

V. CONCLUSIONS

Leadership style and strategic change implementation

The investigation was keen to bring out the underlying link between the style of leading and the need to ensure that change

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Effects of Conflict Resolution approaches on Household Economy in Wajir East Sub-County Wajir County, Kenya

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Abstract

Conflict is the occurrence of competition, aggressive mentality, antagonism and hostility among different communities with varying opinion and interests. Several strategies from traditional to modernized/civilized have been utilized over time without success in Wajir East Sub-County of the larger Wajir County in Kenya. The current work, therefore aimed at establishing effects of conflict resolution approaches on household economic development in the perspective of Wajir East Sub-County. Specifically, the academic work sought to find out the influence of mediation, arbitration and negotiation by council of elders on household economic development.

Descriptive research design utilizing stratified random sampling technique to sample and subject semi-structured questionnaires to 8 village elders, 4 Members of County Assembly, one (1) imam, 3 civil organizations personnel,

250 police officers and 42 civilians (residents). Both descriptive and inferential findings prompted insights into conflict resolution approaches correlation with household economic development. The findings evolved recommendations to inform addressing conflict in Wajir East sub-County.

were utilized to examine academic anxiety indicators derived from previous studies and their association to students' academic performance in the perspective of 357 Technical University of Kenya. The findings provide insights into increased anxiety levels correlation with student performance.

Index Terms: Household Economic development, conflict, mediation, arbitration, negotiation.

1.1 INTRODUCTION

Like any sub-region in the world, household economic activities in Wajir East sub-County support and sustain families as well as contributing to the economic growth of Wajir County and the nation of Kenya (Amodio & Di Maio, 2017). Unfortunately, chronic conflicts that are as old as mankind history in the North-Eastern region of Kenya, always disrupt, slow down, reverse and/or destroy hard-won household income activities in this sub-county.

Largely, these conflicts, common in North-Eastern part of Kenya are traced to long term marginalization in sharing of national resources resulting into inadequate healthcare facilities, education, infrastructure and water and sanitation among others (Ghorpade, 2017). Coupled with the hostile climate that limits drivers of social and economic transformation, marginalization has made rampant poverty, low educational achievement and low participation in national leadership, have become part and parcel of this region (Kenya Inter Agency Rapid Assessment- KIARA, 2018).

To that end, livestock is only major suitable economic activity in the sub-county like any other of North-Eastern. However, limited pasture and water due to bad weather conditions breeds competition for these key resources leading to persistent interclan conflicts. For instance, report, between 2014 to 2017 violent conflicts left 500 people killed, 800 injured, and displacement of 4,560 households.

Houses, crops, food stores, shops, were torched and vandalized, crops destroyed and over 20,000 livestock were stolen or killed (KIARA, 2018).

Undoubtedly, the conflicts have and continue to disrupt household economic engagements including livestock, crop-growing and commercial activities. Conflicts result into killing, injuring and displacement of economically able people, disrupt movement of goods and people, as well as forcing withdrawal of existing and prospective investors and donors among other disruptions in the sub-county. (KIRA, 2018; and KRCS, 2015).

While it is appreciated countless formal resolution interventions have been made, there has been little success as conflicts still linger. Although less embraced, developed and used, alternative dispute resolutions (ADR), especially mediation, arbitration and negotiation have proved viable in conflict resolution in most conflict ravaged regions in many countries worldwide (Smith & Frankenberger, 2018). It is this school of thought that motivated the current study to test the viability of ADR by examining the effect of mediation, arbitration and negotiation on household economic development in Wajir East sub-County.

1.2 Problem Statement

Economic disruptions such as the killing 500, injuring 800 and displacement of 4,560 economically able people,

killing and stealing 20,000 livestock, destroying crops, food stores, shops and other assets persist. Also, disruption of movement of goods and people, withdrawal of existing and prospective investors and donors continue despite concerted conflicts interventions (KIRA, 2018; and KRCS, 2015).

In spite of adverse economic disruptions associated with conflict, little research exists in this area as most studies in the context of developed countries. To fill this scholarly gap, the current study sought to examine the relationships between household economic activities and conflict and generate knowledge to guide stakeholders address conflict in Wajir East sub-County.

1.3 Research Objectives.

The following objectives guided this study:

- (i) To determine the effect of mediation on household economic development in Wajir East Sub-County, Wajir County.
- (ii) To analyze the effect of arbitration on household economic development in Wajir East Sub-County, Wajir County.
- (iii) To establish the effect of negotiation on household economic development in Wajir East Sub-County, Wajir County.

LITERATURE REVIEW

Tafese (2016) advises mediators to avoid biased decisions for effective mediation to resolve and reach higher the number of agreements. He further roots for use expert mediation experience to facilitate to solve cases. Lederach (2017) urges mediators to advocate for peaceful agreements and employ non-binding recommendation in cases that do not reach mutual agreement. Further, Moore, (2014), argues that collaboration ties enable a community to perform better with regard to the development goals.

Tellidis and Kappler (2016), assert that arbitration's feature of relying on evidence to make verdict qualifies it a more formal conflict mechanism that yields better dispute outcomes and to ensure a solution is binding. Also, it is prudent for decisions or solutions arrived at being confidential, prevents spread of unnecessary intrusion by busy bodies, have a verdict not be appealable.

Verme and Gagliarano (2019) opine that a negotiation process should be done in a fair and objective manner and that elders ought to apply a lot of experience and knowledge in solving cases. Additionally, they suggest that explicit rules and regulations need be established to guide negotiators in conflict resolution. According to Crost, Felter and Johnston (2016), elders forming a dominant component of the customary mechanisms of conflict management and operations of elders' courts involving older men with experience in issues related to conflict management as well as having complainants given equitable chances of personal defense negotiation process, are key in effective conflict resolution, a view shared by Muigua (2016).

METHODOLOGY

A descriptive research design was adopted. The study targeted elders, members of county assembly, imams, civil organizations personnel working in the affected region, police officers and recently worst affected conflict victims from the sub-county. Through stratified random sampling, 8 village elders, 4 Members of County Assembly and one (1) imam in the sub-county at time of the study, were sampled to participate in the research. Additionally, 3 civil organizations personnel, 250 police officers and 42 were subjected to semi-structured questionnaires to collect data.

Primary as well as secondary data formed basis for the current study. Quantitative techniques assisted in analyzing quantitative data while qualitative data was analyzed by content analysis and a prose form presentation. To determine the association between conflict resolution approaches and household economic development in Wajir East Sub-County, multiple regression model was maximized. Findings were presented in tables and figures with explanations and inferences given after every table and figure.

RESULTS AND DISCUSSION

Descriptive findings on mediation established prevalence of biased decisions, non-use of experienced, use of non-binding recommendations and collaboration ties during conflict resolution process. Inferential findings post a significant and negative ($B=0.613$, $t=-2.478$, $p=0.015$) relationship between mediation conflict resolution approach and household economic development in Wajir East Sub-County. Implicitly, a unit change in the effectiveness of mediation conflict resolution approach would result in a unit

change in household economic development by a value of 0.613 in Wajir East Sub-County.

On arbitration approach, descriptive findings reported non-reliant on evidence to make verdict, non-solution binding, lack of confidential and non-appealable verdict should.

Regression statistics ($B=0.823$, $t=-1.993$, $p=0.049$) demonstrated a significant and negative relationship between arbitration and household economic development. As such, a unit decrease in the arbitration conflict resolution

mechanism effectiveness would result in increase in destruction of household economic development by a value of 0.823 in Wajir East Sub-County.

Concerning negotiation conflict resolution approach, descriptive findings documented unfairness and subjectivity, elders' rare use of experience, unelaborate rules and regulations, non-involvement of experienced older men and complainants never given equitable chances of personal defense existed.

On relationship between negotiation conflict resolution approach and household economic development, the regression outcome ($B=0.847$, $t=-2.076$, $p=0.049$) demonstrated a significant and negative relationship between negotiation and household economic development. Specifically, a unit decrease in the negotiation effectiveness would result in a unit increase in destruction of household

economic development by a value of 0.847 in Wajir East Sub-County

Overall, the research revealed that conflict resolution approaches are ineffective. This failure has led to disruption and damage of household economic development such as killing, injuring and displacement of able workforce. Also, disruption and damage of livestock and crop farming through stolen/killed, crop and food stores destruction. Too, business is disrupted and trading premises are still being torched and vandalized as well as interruption of movement of goods and people engaging in trade as well as withdraw and discouragement of donors and investors.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

To that end, the study recommended the reconfiguration of the three conflict resolution mechanisms to prevent biased decisions, use expert mediation experience, employ non-binding recommendations and maximization of collaboration ties during conflict resolution process. Likewise, evidence to make verdict should be relied on, make the solution binding, decisions or solutions arrived at should be confidential and a verdict should be appealable. Further, negotiation process should be fair and objective, elders should apply a lot of experience and knowledge and elaborate rules and regulations should be well-defined to guide negotiators. In addition, elders should form a dominant component of conflict management, involve older men with experience and complainants should be given equitable chances of personal defense in Wajir East Sub-County. Overall, the three dispute resolution mechanisms should be re-engineered for better dispute resolution among communities in the sub-county.

Further investigations need to be carried out to examine more conflict resolution mechanisms used in the sub-county since the current study focused on only mediation, arbitration and negotiation. Equally, more emphasis on livestock as the major economic activity of the area specifically is required to be investigated as the present study gave attention to all economic engagements of the households.

In terms of methodology, other researchers are encouraged widen the target population to include ordinary community dwellers who bear the heavy burden of conflicts to provide more empirical evidence as opposed to this study that focused exclusively on village elders. Too, new studies in this area should consider utilizing more theories, increasing the sample size and application of more research designs to generate more empirical evidence.

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Performance Appraisal An Outcome Of Performance Contracting In Insurance Firms In Kenya Nairobi County

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Abstract- Through performance appraisal an organization undertakes to measure the set goals against employee actual performance with respect to the period in question. It is also used to identify an employee's weaknesses and strengths and provide for appropriate adjustments. This study examined the importance of performance appraisal as an outcome of performance contracting in insurance firms in Kenya. The study employed a descriptive approach for and used a population that consisted of 49 heads of performance contracting sections of 49 Kenyan insurance firms. A census method of sampling was used due to the availability of the population. A standardized questionnaire was used as main data collection instrument. The Statistical Package for Social Sciences (SPSS, version 24) analyzed the quantitative statistics and generate descriptive statistics. using the Using tables and figures for presentation, the study found that; performance appraisal affects employee performance among insurance firms in Kenya. The study findings revealed that there was effective performance appraisal procedures and methods in place that were used by the management in insurance firms in Kenya. The study recommends that; insurance firms in Kenya in collaboration with the IRA should structure and review their performance appraisal policy to include their support employee

Index Terms- Organizational Performance, Performance Appraisal, Performance Appraisal Methods, insurance firms

I. INTRODUCTION

Today's organizations seem to change much more rapidly than in the past because of increased competition and the ever-changing business environment. This explains why organizations require managing and improving their performance through performance contracting so as to be competitive. Lardi (2008), defines a performance contract as written agreement between a government or its affiliated organization and the management of public enterprises. It contains specific measurable objectives for a period and when the period lapses, the overall performance is examined using the set objectives. (World Bank, 2018). Performance contracting has been regarded as an effective measure of enhancing performance in organization as well as governmental agencies. (Prajapati, 2010).

The objective of introducing performance contracts was to advance on quality delivery and services through better performance by making managers accountable for results; maximize national resources through enhanced performance;

reduce dependency on the national treasury; effective resource usage by incorporating a culture of accountability and transparency, improve effectiveness and ensure that public resources were used on attaining national goals set out and reduced misunderstanding resulting from multiplicity of objectives (Boyne, 2015). The major contribution of performance contracting is that it focuses on attaining results - competitive products and services for customers inside and outside the organization. Opiyo (2006) notes that performance contracting has facilitated managers to have a positive attitude towards their staff and it has encouraged innovation, improved service delivery, better customer service, efficient resource utilization and performance centered culture in the public service. (Prajapati, 2010)

Performance contracts specify acceptable standards of performance or measurable targets which the insurance firms require its employees to attain in a given period. (insurance industry annual report, 2018).

Performance contracting from a Kenyan perspective designed by blending global best practices as well as borrowing from the Balanced Score Card. It also provides linkages between strategic objective, long term goals and the annually set budgets (GoK, 2010). PC in Kenya was first witnessed in government agencies in the management of state corporations in 1989 as a way of improving service delivery. The emergence of signing performance contracts between the Kenyan government and other agencies began in April 1989. The Kenya Railways Corporation signed the first contract. It was followed suit by the National Cereals Board (Kobia & Mohamed, 2006). The Cabinet Memorandum No. 90 of 1990 paved the way for PC in public institutions (Murui & Orwa, 2013). The Public Sector Reforms of 1993 by the Kenyan government rationalized and contained the public service resulted in a colossal job loss for employees in job group A-G. (Opiyo, 2006).

II. PAST STUDIES

Performance Appraisal (PA) is a formal process of reviewing and evaluating employee performance and providing a corrective action if targets are not met or giving a credit of work well done (Make staff Review Count, 2009). The aims of PA are; organizational goal alignment, manager-employee communication, employee development, effective personnel administration Organizations goal alignment is the ultimate objective of a performance management process where individual performance is aligned with organizational performance argues that the goal of alignment process is to create a result-oriented

culture which is a significant benefit of the performance appraisal exercise. According to argue that manager-employee communication is the rapport between employees and management about the feedback on organizational activities, events and performance towards organizational goals and objectives.

In a study on examining the transformation of the public service with regards to performance contracting Wanyama (2013) examined performance management in public institutions in Kenya. The study sought to examine whether performance contracting had an effect on government institutions in Kenya. From its onset, the study examined the efficiency and efficacy. Other areas examined were transparency and accountability of Resources. Mbuu and Sarisar (2013) when exploring the challenges witnessed when implementing PC in the Kenyan public sector. The study established that several challenges face PC and the sustainability of performance gains remains a key issue. Public Contracting must strive to improve public sector delivery while at the same time addressing the challenges observed. Gakure, Muriu and Orwa (2013) examined the effect of PC on different departments in civil service performance in Kenya. through a proportionate sample of 108 respondents out of a possible 1072, the study results were analyzed and the correlations showed there is a strong relationship between performance contracting and performance effectiveness. The variance also revealed that performance contracting is significant on performance. The regression model shows that an increase in performance contracting increased in performance effectiveness. The study results show the effort the government is making in performance contracting in terms of effort and cost. It is concluded from the findings that performance contracting leads to effectiveness of performance. When it comes to Performance Contract on Organization Performance, Letangule, and Letting's (2012) study revealed the performance contracting affected delivery of service the overall service quality and employee creativity. On examining the influencing factors of PC in Kenya, Gathai, Ngugi, Waithaka and Kamingi (2012) examining employees of Kenya Civil Authority, examined contracts signed between 2009 and 2012. The results show that the targets achieved were in tandem with the organizations objectives. Akaranga's(2008), study reveals that all government parastatals and agencies had put performance contracting in place. The study results show that there was an improvement in incomes as well as the delivery of service by the said agencies. The financial year results for the year ending 2005/6 also show that revenue exceeded expenditure. Performance contracting can be detrimental when too much focus is given to targets and how they can be achieved. It is even more disadvantageous when the said targets are not in tandem with the expected outcomes. (Keelaar,2007). Kobia and Mohammed (2006) examined the challenges and successes that have been noted as a result of performance contracting. In their survey among civil servants, 280 respondents who consisted mainly of senior employees of the civil service noted that they did not have an understanding or the use of performance contracting at the organization level. The employees were stationed at the Kenya Institute of Administration. The results show that while PC had been implemented, there was little effort to make the employees know about it or its potential benefits.

In their study Marjorie et al (2006) identified the following as challenges of the process of appraisal. They are viz. increased red tape; little commitment; uncertainty when seeking areas for development and the rewarding process; and bias in judgment. Little devotion on the side of the government to the promised incentives was ranked highest by respondents. Similarly, Shirley et al (2001) ranked lack of commitment as the highest challenge in China. Bias in judgment was ranked second with a significant difference of 5% level of significance between high management and subordinates.

III. METHODOLOGY

A Research Design

This study adopted a descriptive research design. According to Kothari (2012) it is a systematic technique used to observe and describe the comportment of a matter without any influence. Descriptive research design is a design that is suitably used when explaining a phenomenon (for describing a situation and especially the manner in which independent variables influence the dependent variable). Notably the present study described the manner in which performance contracting is linked to employee performance in insurance firms in Kenya, rendering descriptive research design ideal for it (Gupta & Rangi, 2014).

B Target Population

The target population is defined as entire group of individuals or objects possessing same observable characteristics and from where the findings can be generalized (Mugenda & Mugenda, 2003). Insurance Regulatory Authority [IRA] (2018) indicates that there are 49 Registered Insurance firms in Kenya. So, in this study, the target population consisted of 49 heads of performance contracting sections of 49 insurance firms in Kenya as captured in the sampling frame (see appendix III). This population was chosen because they were the implementers of the performance contracting in insurance firms in Kenya. So, the respondents to the study were the heads of performance contracting sections of the insurance firms in Kenya while the unit of analysis was the insurance companies.

IV. RESULTS AND DISCUSIONS

Demographic information

The study found that 14 (34.15%) of the respondents were 51 years and above as 12(29.27%) of the respondents were between 41 and 50 years while 15 (36.59%) of the respondents were between 31 and 40 years. Majority of the respondents 23 (56.10%) had worked for a period between 16 years and above, 16 (39.02% of the respondents had worked for a period of 6-10 years, while 2 (4.88%) of the respondents had worked for a period of between 11 and 15 years as shown on figure 4.4. These results implies that majority of the employees of insurance companies at the management level have had over 6 years of work experience.

C Descriptive Analysis

Using quantitative analysis, the study yielded descriptive statistics showing the properties of the study variables when assessing the study objective as well as the manner in which the

variables affected each other and especially the independent and dependent variables. The results were just direct answers to the questions in the tool which were presented using percentages, frequencies, means and standard deviations

Performance Appraisal and Employee Performance

The study assessed the first objective to establish the importance of performance appraisal on employee performance in insurance firms in Kenya by first seeking to establish the level of goal setting at every performance appraisal. According to the

results, 154 (82.93%) of the respondents agreed that they set goals at every performance appraisal, while 34 (17.07%) of the respondents disagreed that they did not set goals at every performance appraisal as shown on figure 4.5. The findings are consistent with (Lorsch, 2002), who found out that, unless the supervisors do the appraising themselves, they cannot adequately discharge their responsibilities of assisting and training the subordinates.

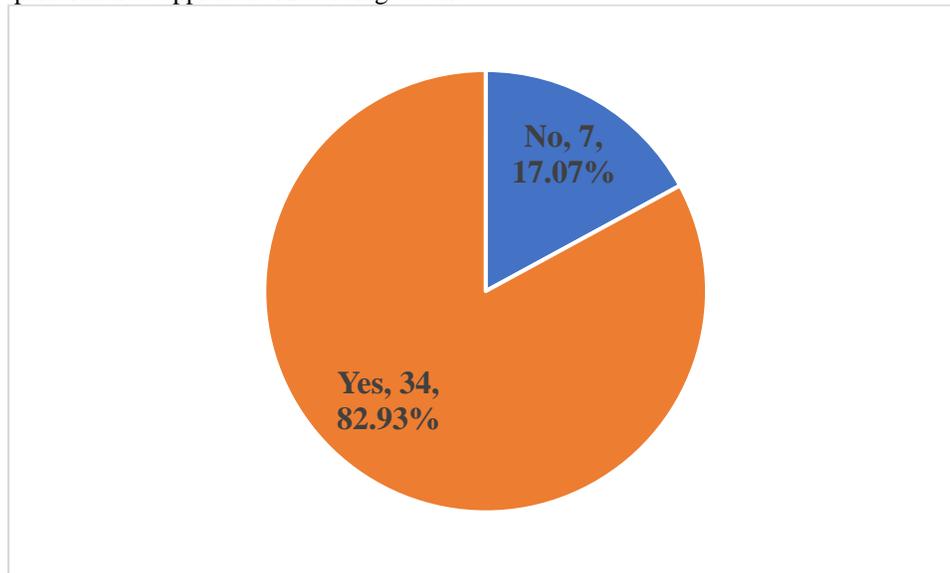


Figure 4.1: Goal Setting

Performance appraisal was used as one of the factors that affect employee performance of insurance firms in Kenya. The respondents were therefore required to rate their responses on a 5-point Likert scale of 1-5; 5= Strongly Agree;4= Agree; 3= Neutral;

2= Disagree; 1=Strongly Disagree as shown on Table 4.2. on average, they strongly agreed that the performance appraisal was high (M = 4.35; SD=0.88).

Table 4.1: Performance Appraisal

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
My appraiser helps me to understand the process used to evaluate and rate my Performance	0	0.00%	0	0.00%	7	17.07%	22	53.66%	12	29.27%
The performance appraisal review discussion is the only time I get feedback about my performance	0	0.00%	1	2.44%	2	4.88%	25	60.98%	13	31.71%
Employees are provided with feedbacks to help improve their performance	0	0.00%	3	7.32%	8	19.51%	23	56.10%	7	17.07%

The results show that the majority of the respondents forming 22 (53.66%) agreed that the appraisers helped the employees to understand the process used to evaluate and rate their performance. Meanwhile a majority of 25 (60.98%) of the respondents agreed that performance review discussion is the only time they get feedback about their performance while a majority of 23 (56.10%) of the respondents agreed that they were provided with feedback to help them improve their performance. The results showed that the they set goals at every performance appraisal.

These results show that there was high appreciation of performance appraisal among insurance companies in Kenya where they had appraisers who were helping the employees to understand the process used to evaluate and rate their performance while they used performance review discussion is the only time they get feedback about the employee performance. according to these results, the performance appraisal exercise ensured employees were provided with feedback to help them improve their performance. Various empirical literature has associated

performance appraisal with employee performance with most of the studies showing that performance appraisal affects employee performance as confirmed in this study. In the study by Gakure *et al.* (2013), it was revealed that performance contracting significantly affects performance while in their Letangule, and Letting (2012) revealed that performance contracting affected service quality, efficiency, and consistency and employee creativity at the ministry of education to a great extent. Although In their study Marjorie *et al.* (2006) identified challenges of the process of appraisal as lack of commitment; tension about identifying development needs and allocation of rewards, Gathai *et al.* (2012) concluded that performance measurements are used

to evaluate, control and improve operations process for ensure achievement of organizational goals and objectives.

D Inferential Analysis

Performance appraisal and employee performance in insurance firms in Kenya

The study tested the null hypothesis

H₀₁: Performance appraisal has no significant effect on employee performance in insurance firms in Kenya

To produce the results in Table 4.7

Table 1: Analysis by Responses against predicted responses

Predicted responses categories		Count	%within
My appraiser helps me to understand the process used to evaluate and rate my Performance	Neutral	7	17.07%
	Agree	22	53.66%
	Strongly Agree	12	29.27%
The performance appraisal review discussion is the only time I get feedback about my performance	Disagree	1	2.44%
	Neutral	2	4.88%
	Agree	25	60.98%
	Strongly Agree	13	31.71%
Employees are provided with feedbacks to help improve their performance	Disagree	3	7.32%
	Neutral	8	19.51%
	Agree	23	56.10%
	Strongly Agree	7	17.07%
Total		41	100.00%

According to these results, the model seems to be doing good of predicting outcome categories, for “My appraiser helps me to understand the process used to evaluate and rate my Performance (agree)” the models correctly classifies 53.66%, “the performance appraisal review discussion is the only time I get feedback about

my performance (agree)” classifies 60.98%, and Employees are provided with feedbacks to help improve their performance (neural) classifies 56.10%.

The regression results are captured in table 4.8

Table 2: Logistic Results for Performance appraisal and Service delivery

Model Fitting Information					
Model	-2	Log	Chi-	df	Sig.
Intercept Only	62.807	Likelihood	Square		
Final	59.195		3.612	8	0.890
Goodness-of-Fit					
		Chi-Square	df	Sig.	
Pearson	50.253		43	0.208	
Deviance	42.271		43	0.503	

Pseudo R-Square

Cox and Snell	0.084
Nagelkerke	0.094
McFadden	0.039

Test of Parallel Lines

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	59.195			
General	.000b	59.195	16	0.000

Explanatory variables associated with high level of Service delivery

Item name	Regression coefficient	p-value
My appraiser helps me to understand the process used to evaluate and rate my Performance	-0.267	0.566
The performance appraisal review discussion is the only time I get feedback about my performance	0.15	0.725
Employees are provided with feedbacks to help improve their performance	-0.003	0.996

The model fitting information show the p-value was 0.890 indicating that there is no significant reduction in the chi-square statistics ($p > .005$). The chi-square statistic (3.612) indicates that the model does not give a significant improvement over the baseline intercept-only model, implying that the model does not give better predictions than just guessing based on the marginal probabilities for the outcome categories.

The Goodness-of-Fit, which contains Pearson's chi-square statistic for the model and chi-square statistic based on the deviance for testing inconsistencies of observed data with the fitted model, shows that these statistics not significant. However, they are large enough to conclude that the data and the model predictions are similar. So, the model is a good one. The

Nagelkerke R^2 (0.094) indicates the model can account for 9.4% of the variance in service delivery. The test of parallel lines rejects the null hypothesis of the assumption that across response categories". So, the model does not fit the data well since the observed significant level is very small.

These results show that :”my appraiser helps me to understand the process used to evaluate and rate my Performance” (p-value = 0.566), “the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.725), “employees are provided with feedbacks to help improve their performance” (p-value = 0.996) are not significant with service delivery.

Table 3: Logistic Results for Performance appraisal and Employees motivation

Model Fitting Information					
Model	-2 Log Likelihood	Log Chi-Square	df	Sig.	
Intercept Only	64.321				
Final	58.423	5.897	8	0.659	
Link function: Negative Log-log.					
		Chi-Square	Df	Sig.	
Pearson	37.320	60	0.991		
Deviance	38.023	60	0.988		
Pseudo R-Square					
Cox and Snell	0.134				
Nagelkerke	0.147				

McFadden	0.059				
Test of Parallel Linesa					
Model	-2	Log	Chi-Square	df	Sig.
Intercept Only	75.514				
Final	67.350		8.163	8	0.418

Explanatory variables associated with high level of employee’s motivation

Item name	Regression coefficient	p-value
My appraiser helps me to understand the process used to evaluate and rate my Performance	-0.112	0.802
The performance appraisal review discussion is the only time I get feedback about my performance	0.444	0.280
Employees are provided with feedbacks to help improve their performance	-0.882	0.117

The model fitting information show the p-value was 0.659 indicating that there is no significant reduction in the chi-square statistics (p>.005). The chi-square statistic (5.897) indicates that the model does not give a significant improvement over the baseline intercept-only model, implying that the model does not give better predictions than just guessing based on the marginal probabilities for the outcome categories.

The Goodness-of-Fit, which contains Pearson's chi-square statistic for the model and chi-square statistic based on the deviance for testing inconsistencies of observed data with the fitted model, shows that these statistics not significant. However, they are large enough to conclude that the data and the model predictions are similar. So, the model is a good one. The

Nagelkerke R² (0.149) indicates the model can account for 14.90% of the variance in service delivery. The test of parallel lines accepts the null hypothesis of the assumption that across response categories”. So, the model fits the data well since the observed significant level is large.

These results show that :”my appraiser helps me to understand the process used to evaluate and rate my Performance” (p-value = 0.802), “the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.280), “employees are provided with feedbacks to help improve their performance” (p-value = 0.117) are not significant with employees motivation.

Table 4: Logistic Results for Performance appraisal and customers satisfaction

Model Fitting Information					
Model	-2	Log	Chi-Square	Df	Sig.
Intercept Only	75.514				
Final	67.350		8.163	8	0.418
Goodness-of-Fit					
		Chi-Square	df	Sig.	
Pearson		46.505	60	0.899	
Deviance		47.778	60	0.873	
Pseudo R-Square					
Cox and Snell	0.181				
Nagelkerke	0.195				
McFadden	0.076				
Test of Parallel Linesa					
Model	-2	Log	Chi-Square	df	Sig.
	Likelihood				

Null Hypothesis	67.350			
General	39.422b	27.928c	24	0.263

Explanatory variables associated with high level of customers satisfaction

Item name	Regression coefficient	p-value
My appraiser helps me to understand the process used to evaluate and rate my Performance	1.863	0.007
The performance appraisal review discussion is the only time I get feedback about my performance	-0.575	0.170
Employees are provided with feedbacks to help improve their performance	0.401	0.471

The model fitting information show the p-value was 0.419 indicating that there is no significant reduction in the chi-square statistics ($p > .005$). The chi-square statistic (8.163) indicates that the model does not give a significant improvement over the baseline intercept-only model, implying that the model does not give better predictions than just guessing based on the marginal probabilities for the outcome categories.

The Goodness-of-Fit, which contains Pearson's chi-square statistic for the model and chi-square statistic based on the deviance for testing inconsistencies of observed data with the fitted model, shows that these statistics not significant. However, they are large enough to conclude that the data and the model predictions are similar. So, the model is a good one. The

Nagelkerke R^2 (0.195) indicates the model can account for 19.50% of the variance in service delivery. The test of parallel lines accepts the null hypothesis of the assumption that across response categories". So, the model fits the data well since the observed significant level is large.

These results show that :my appraiser helps me to understand the process used to evaluate and rate my Performance" (p-value = 0.007)was significant with customers satisfaction while "the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.170), "employees are provided with feedbacks to help improve their performance" (p-value = 0.471) are not significant with customers satisfaction.

Table 5: Logistic Results for Performance appraisal and Employee commitment

Model Fitting Information					
Model	-2 Log Likelihood	Chi-Square	df	Sig.	
Intercept Only	70.263				
Final	63.990	6.273	8	0.617	
Goodness-of-Fit					
	Chi-Square	Df	Sig.		
Pearson	41.329	60	0.969		
Deviance	41.627	60	0.966		
Pseudo R-Square					
Cox and Snell	0.142				
Nagelkerke	0.152				
McFadden	0.057				
Test of Parallel Lines					
Model	-2 Log Likelihood	Chi-Square	df	Sig.	
Null Hypothesis	63.990				
General	41.548b	22.442c	24	0.553	

Explanatory variables associated with high level of Employee commitment

Item name	Regression coefficient	p-value
My appraiser helps me to understand the process used to evaluate and rate my Performance	2.189	0.001
The performance appraisal review discussion is the only time I get feedback about my performance	0.066	0.870
Employees are provided with feedbacks to help improve their performance	0.383	0.48

The model fitting information show the p-value was 0.617 indicating that there is no significant reduction in the chi-square statistics ($p > .005$). The chi-square statistic (6.273) indicates that the model does not give a significant improvement over the baseline intercept-only model, implying that the model does not give better predictions than just guessing based on the marginal probabilities for the outcome categories.

The Goodness-of-Fit, which contains Pearson's chi-square statistic for the model and chi-square statistic based on the deviance for testing inconsistencies of observed data with the fitted model, shows that these statistics not significant. However, they are large enough to conclude that the data and the model predictions are similar. So, the model is a good one. The

Nagelkerke R^2 (0.152) indicates the model can account for 15.20% of the variance in service delivery. The test of parallel lines accepts the null hypothesis of the assumption that across response categories". So, the model fits the data well since the observed significant level is large.

These results show that :my appraiser helps me to understand the process used to evaluate and rate my Performance" (p-value = 0.001) was significant with employee commitment.while "the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.870), "employees are provided with feedbacks to help improve their performance" (p-value = 0.480) are not significant with employee commitment.

Table 6: Logistic Results for Performance appraisal and Employees promotion

Model Fitting Information					
Model	-2 Log Likelihood	Log	Chi-Square	df	Sig.
Intercept Only	68.694				
Final	56.643		12.050	8	0.149
Goodness-of-Fit					
		Chi-Square	df		Sig.
Pearson		30.169	60		1.000
Deviance		34.045	60		0.997
Pseudo R-Square					
Cox and Snell		0.255			
Nagelkerke		0.274			
McFadden		0.110			
Test of Parallel Linesa					
Model	-2 Log Likelihood	Log	Chi-Square	df	Sig.
Null Hypothesis	56.643				
General	41.364b		15.280c	24	0.912

Explanatory variables associated with high level of Employees promotion

Item name	Regression coefficient	p-value
My appraiser helps me to understand the process used to evaluate and rate my Performance	2.708	0.000
The performance appraisal review discussion is the only time I get feedback about my performance	2.62	0.039
Employees are provided with feedbacks to help improve their performance	1.811	0.046

The model fitting information show the p-value was 0.149 indicating that there is no significant reduction in the chi-square statistics ($p > .005$). The chi-square statistic (12.050) indicates that the model gives a moderate significant improvement over the baseline intercept-only model, implying that the model gives better predictions than just guessing based on the marginal probabilities for the outcome categories.

The Goodness-of-Fit, which contains Pearson's chi-square statistic for the model and chi-square statistic based on the deviance for testing inconsistencies of observed data with the fitted model, shows that these statistics not significant. However, they are large enough to conclude that the data and the model predictions are similar. So, the model is a good one. The

Nagelkerke R^2 (0.274) indicates the model can account for 27.40% of the variance in service delivery. The test of parallel lines accepts the null hypothesis of the assumption that across response categories". So, the model fits the data very well since the observed significant level is large.

These results show that :”my appraiser helps me to understand the process used to evaluate and rate my Performance” (p-value = 0.000), “the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.039), “employees are provided with feedbacks to help improve their performance” (p-value = 0.046) are significant with employees promotion.

Table 7: Logistic Results for Performance appraisal and Performance contracting

Model Fitting Information					
Model	-2 Log Likelihood	Chi-Square	df	Sig.	
Intercept Only	70.655				
Final	58.820	11.835	8	0.159	
Goodness-of-Fit					
	Chi-Square	df	Sig.		
Pearson	32.966	60	0.998		
Deviance	36.458	60	0.993		
Pseudo R-Square					
Cox and Snell	0.251				
Nagelkerke	0.269				
McFadden	0.107				
Test of Parallel Linesa					
Model	-2 Log Likelihood	Chi-Square	df	Sig.	
Null Hypothesis	58.820				
General	118.528b	.c	24		

Explanatory variables associated with high level of Performance contracting

Item name	Regression coefficient	p-value
My appraiser helps me to understand the process used to evaluate and rate my Performance	2.575	0.001

The performance appraisal review discussion is the only time I get feedback about my performance	0.031	0.938
Employees are provided with feedbacks to help improve their performance	0.722	0.193

The model fitting information show the p-value was 0.15 indicating that there is no significant reduction in the chi-square statistics ($p > .005$). The chi-square statistic (11.835) indicates that the model gives a moderate improvement over the baseline intercept-only model, implying that the model gives a better prediction than just guessing based on the marginal probabilities for the outcome categories.

The Goodness-of-Fit, which contains Pearson's chi-square statistic for the model and chi-square statistic based on the deviance for testing inconsistencies of observed data with the fitted model, shows that these statistics not significant. However, they are large enough to conclude that the data and the model predictions are similar. So, the model is a good one. The Nagelkerke R^2 (0.269) indicates the model can account for 26.90% of the variance in service delivery. The test of parallel lines accepts the null hypothesis of the assumption that across response categories". So, the model fits the data very well since the observed significant level is large.

These results show that :my appraiser helps me to understand the process used to evaluate and rate my performance" (p-value = 0.001) was significant with performance contracting while "the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.938), "employees are provided with feedbacks to help improve their performance" (p-value = 0.193) are not significant with Performance contracting.

According to these results, while all other relationship were significant;

- my appraiser helps me to understand the process used to evaluate and rate my Performance" (p-value = 0.007) was significant with customers satisfaction
- my appraiser helps me to understand the process used to evaluate and rate my Performance" (p-value = 0.001) was significant with employee commitment
- my appraiser helps me to understand the process used to evaluate and rate my Performance" (p-value = 0.000), "the performance appraisal review discussion is the only time I get feedback about my performance (p-value = 0.039), "employees are provided with feedbacks to help improve their performance" (p-value = 0.046) are significant with employees promotion
- my appraiser helps me to understand the process used to evaluate and rate my performance" (p-value = 0.001) was significant with performance contracting

V. CONCLUSIONS AND RECOMMENDATIONS

A Conclusion

It was found that performance appraisal has relationship with employee performance among insurance firms in Kenya. It was further found that there is very high level of goal setting at every performance appraisal among insurance firms in Kenya where these companies set goals at every performance appraisal. The appraisers help employees understand the process used to evaluate

and rate their performance while the performance review discussion is the only time the companies get feedback about employee performance. the study found that the employees are provided with feedback to help them improve their performance. notably, there is high performance appraisal among insurance firms in Kenya which spurs the employee performance of these institutions. The study concludes that there is effect of performance appraisal on employee performance among insurance firms in Kenya. The performance appraisal is necessary for helping employees understand the process used to evaluate and rate their performance, assisting the firm to get feedback about employee performance and providing employees with feedback which helps employee improve their performance.

VI. RECOMMENDATION

The study made related policy recommendation as informed by the findings. Firstly, the study recommends that insurance firms in Kenya in collaboration with the IRA should structure and review their performance appraisal policy to include their support employee (low level staff) through representatives into the performance contacting team. These representatives are vital for informing the performance contacting team on issues bedeviling the employees as it also makes the employees clearly understand the evaluation process. Inclusion of the se of employees will also release the tension that builds between the different levels of employees in organizations and hence create conducive performance appraisal process.

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An Assessment of the Impact of Constituency Development Fund on Rural Development in Education and Health Sectors in Rufunsa Constituency, Zambia

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Abstract- This study envisioned to empirically assess the impact of Constituency Development Fund (CDF) on rural development with specific reference to education and health services in Rufunsa Constituency, east of Lusaka, Zambia. The objectives of the study were: to assess central government's consistency in disbursing CDF fund to Rufunsa Constituency; to assess the impact of CDF in the provision of health and education facilities in Rufunsa constituency; and to assess the level of community participation in CDF funded projects in the health and education sectors in Rufunsa Constituency. The study adopted a descriptive analytical research design incorporating quantitative and qualitative methodological paradigms with the questionnaires and semi-structured interviews as main data collection tools. The data analysis was performed through Statistical Package for Social Scientists (SPSS) for quantitative and content analysis for qualitative data. The sample size of the study was 109 respondents residing in Rufunsa Constituency, who comprised three (3) respondents (community members) from each of the ten (10) health facilities and ten (10) schools of the three (3) wards as beneficiaries; ten (10) health facility administrators; ten (10) school administrators, ten (10) health staff and ten (10) teaching staff. From the civic side, there were one (1) Member of Parliament (MP), three (3) ward councillors and five (5) CDF committee members. The study revealed that Government has not been consistent in the disbursement of funds as most of the school and health facilities under study had not received CDF funding in the past five years. Factually, for the period under review, the constituency as a whole received only twice (total of K2, 150,000.00) out of five times (K7,000,000.00) from 2016 to 2020 thereby robbing the constituency of over K4,850,000 deserved development fund. Besides, local communities and stakeholders were generally not involved in project identification, preparation, implementation, monitoring and evaluation processes in the health and education sectors as they were not knowledgeable and unaware of CDF channels, sources, quantity and frequency of disbursement. Ultimately, the study findings demonstrated that CDF in Rufunsa has not played a significant role in health and education services delivery as poverty levels, illiteracy, mortality rates, inequalities and underdevelopment levels were still on the high side. Medical equipment, ambulance services, mortuary facilities, health centres, classrooms, computers, reading materials, health and teaching staff were acutely in short supply.

On the other hand, the study found out that the factors accounting for the low level of community participation in CDF projects included lack of awareness and knowledge of CDF availability, lack of awareness about the right and opportunities for participation, inadequate information dissemination, poverty and poor community attitudes towards development participation and projects. The study concluded that rural development programmes are fundamental tools in improving the lives of people in the rural settings, hence the need for CDF programmes to be prioritised on the national agenda and be properly synchronised in governmental policies in order to mitigate glaring rural underdevelopment. The success of CDF as a rural poverty alleviation strategy can only be achieved with a decisive consideration of numerous factors, which include but not limited to; government consistency in the disbursement of funds and beneficiary participation in the sectors in question. Therefore, the study recommended that more civic education is needed to local communities to enable them make informed decisions and be actively involved in the entire process of the community projects. Furthermore, there is need for government's consistency in funding constituencies, the amount of CDF allocated to each constituency should be increased to adequately improve the health care and education service delivery by taking into account factors such as size of the constituency (geographical / demographic); levels of poverty; and the levels of development required in such constituencies.

Index Terms- Assessment, Constituency Development Fund, Impact, Education & Health Sectors.

I. INTRODUCTION

The world at large deem education and health sectors to be primarily basic human rights and the basis upon which to build peace, harmony, national progress and sustainable development (UNESCO, 2018). Todaro and Smith (2015) also stress that health and education are very important in fostering socio-economic development in both developed and developing countries. They are important ends in themselves (Todaro & Smith, 2015: 359). Education specifically provides people with skills and competencies that allow individuals to perform productive roles; more literate and skilled labour force is likely to yield more returns on investment. Health care on the other hand,

makes the people sound both in mind and body as they undertake what education provides. Thus both health and education promote social development and have strong links to poverty reduction especially in rural settings (Todaro, 2011: 359, UNESCO, 1997). United Nations Economic and Social Council (UNESCO) further illustrates that development in general aims at changing social structures, popular attitudes, and national institutions; the acceleration of economic growth, reduction of inequality as well as the eradication of poverty (UNESCO, 2018). This profound conception is equally posited and heralded by the Southern Africa Development Community (SADC) – a regional body to which Zambia subscribes. However, poverty and underdevelopment in most less developed countries have remained to be the major resounding threats to the effective and efficacious operationalization of these two social-based sectors despite their significance. Poverty is multidimensional and includes factors other than income (factors like education, health, politics, and society, vulnerability which ultimately lead to poverty). While poverty affects people in different ways, for sustainable development to be present, on the other hand, it requires meeting people's basic needs and fulfilling any opportunity of every aspiration for a better life especially for the rural people (Olinto & Uematsu, 2010).

In the light of the foregoing and in order to address the question of rural development and rural poverty, African countries have continuously emphasized on the role of health and education as a means to social and economic development. For rural development to meet sustainable development, it requires special resources and institutions such as health and educational facilities that will fulfil people's aspirations for a better life. In the process of making these institutions present and functional, rural people have to be involved in the development of their respective communities (Pellissery, 2012: 222-225) for the sustainability thereof. In actualising this brilliant vision, Zambia's National Assembly in 1995, made a historic decision to make mandatory the allocation of funds to respective constituencies represented by members of parliament as a model of ensuring decentralised development from the lowest unit of society (GRZ 2006b:1). This annualised funding came to be termed as Constituency Development Fund (CDF) created through an act of parliament in 1995 (GRZ 2006b: 1). The rationale behind this initiative was to provide members of parliament and their constituent communities with the opportunity to make choices and implement projects that maximize their welfare especially in the areas of health and education. This fund was established mainly to assist fight poverty through the implementation of development projects at the local level and particularly those that provide basic needs such as healthcare, education, water, agricultural services, security and electricity (GRZ 2006: 2), among others.

Against this background, this concept paper was purposed to investigate the extent to which the CDF sent to these constituencies meet the stated blue prints with Rufunsa District as an epicentre of the study.

1.1. Problem Statement

Health and education still remain pertinent to the socio-economic development of any community especially rural communities (Todaro, 2011: 359). In 1995, the Government of Zambia introduced Constituency Development Fund (CDF) as a

tool to initiate projects in different sectors aimed at reducing poverty levels as well as improving rural lives (MoLGH, 2006). This endeavour of improving efficiency and utilization in health and education facilities and service delivery was to be carried out in partnership with faith-based organisations and Non-Governmental Organisations like the UNISAFE, Churches Health Association of Zambia, World Vision amongst many others which are supporting health and education service delivery in the constituency with over 51,000 human population. In the health sector, part of CDF is intended to help in building health centres or posts, maternity wards, mortuaries, mothers' shelters among others while in the education sector CDF is expected to help make accessible and available educational infrastructure like physical educational facilities, sanitation blocks, science and computer laboratories, classroom blocks and classrooms as well as libraries. Although such infrastructure and facilities aforesaid are said to have been constructed or put in place, anecdotal evidence indicate that they have not all been funded by CDF and that the improvements (if any) in the lives of people cannot be attributed to CDF. Over and above, the number of health and educational facilities available are far less than the demand of the population as beneficiaries despite the annualised disbursements of the fund for such community-based developmental projects. Since the enactment of the CDF fund in 2005, no systematic and organised studies have been done to thoroughly investigate the phenomena in the subject matter area to which relevance this empirical study will be.

1.2. Study Objectives

- (i) To assess central government's consistency in disbursing CDF to Rufunsa constituency and the challenges inherent in its application.
- (ii) To assess the level of community participation in CDF funded projects in the health and education sectors in Rufunsa Constituency.
- (iii) To assess the impact of CDF in the provision of health and education facilities in Rufunsa constituency.

II. THEORETICAL REVIEW OF LITERATURE

2.1. Rationale for Constituency Development Fund (CDF)

Zambia has 156 constituencies dotted country-wide and each represented by a Member of Parliament elected every after five years. In 1995, the Constituency Development Fund (CDF) was initiated in **Zambia** with the purpose to provide local authorities with discretionary **funds** whose utilisation was solely for the provision of social services such as education, health, water and sanitation, agricultural services and other ancillary benefits to the community. As this fund was envisioned to be purely for community service, its utilisation was expected to occur within a socially inclusive participatory framework to all community members. Against this background and in a hope to consolidate the fund's rationale, the Government of the Republic of Zambia through the National Assembly enacted an act of Parliament on 23rd December 2018 which would guide the disbursement, management and utilization of the fund. **Act No. 11 of 2018** of the Laws of Zambia states:

“An Act to provide for the management, disbursement, utilisation and accountability of the Constituency Development Fund established under the Constitution; establish Constituency Development Fund Committees in constituencies and provide for their composition and functions; and provide for matters connected with, or incidental to, the foregoing.”

By this act of Parliament, it became categorical that the constituency development was national and legal matter which required adherence and compliance by officers in –charge to public finance management ethos in funds utilization. Kaduuli (2008) affirms the importance of CDF, “CDF was introduced within Zambia’s wider decentralization drive as a public fund to finance development projects at the constituency level through elected Members of Parliament”. Therefore, the fund is designed to actively engage the local citizens on their priority needs. It is in this vein that the fund holds strong opportunities in poverty reduction and national development if well managed. These projects have a great influence in the quality of life of rural people especially where poverty is over 70% and they include education and health as priority amongst others.

CDF is an increasingly central fund in national development and plays a key role in rural development as it is situated within the local government framework and was set up by the government to mitigate poverty and harmonize the spread of development throughout the country. According to Chileshe (2011), CDF is one of the most significant transfers disbursed annually to the 156 constituencies. In 2006, the budgetary allocation for CDF was approximately US\$ 13,000 per constituency and had risen to approximately US\$ 200,000 per constituency in 2012 (National Assembly of Zambia, 2012). Since 1995, all the constituencies in Zambia have been eligible to receive the CDF funds (Ministry of Local Government and Housing, 2006).

2.2. Rufunsa District

Rufunsa is one of the newest districts in Lusaka Province which was declared by President Michael Chilufya in 2012. It is located in the eastern side of the province and is largely a rural district. The district has 24 public health facilities ranging from the health centres to the sickbay. In terms of education, the district has 11 primary schools and 3 secondary schools. Politically, the constituency has three wards, namely: Mwachilele, Nyangwenya and Bunda Bunda, each headed by a Councillor with 1 Member of Parliament as head of Council. For development purposes and pursuant to the Act No. 11 of 2018, the constituency has a 5 CDF committee members to co-ordinate development projects with the communities. However, it must be noted that Rufunsa constituency has no district hospital. Over and above, the district as a whole has over 51,000 people as population (CSO, 2010).

The foregoing demographic analysis of the health and school infrastructural statistics relative to available infrastructural space clearly demonstrates an already troubled situation in terms of education and health service delivery and requires liberation by way of infrastructure and other essential resources to match the growing demand.

2.3. Constituency Development Fund and National Development

CDF is meant to socio economically develop societies or the nation as a whole. Apart from the objective of poverty reduction, CDF is also aimed at enhancing people’s participation in decision making processes, promoting good governance, promoting transparency and accountability (Francis et al. 2009: 11). In this framework, Members of Parliament (MPs) and local governments are assumed to be the primary agencies of providing social services to communities. Nonetheless, forms of CDF differ in terms of the amount, allocation principles and utilization. CDF is meant to respond to immediate, short-term community development needs and ensure that rural development spreads evenly throughout the country. However, unlike other development funds that filter from the central government through larger administrative organs and bureaucracies; funds under CDF program go directly to the local communities (NAZ, 1994: 1053). This gives local people the opportunity to participate in establishing local projects like health and educational programs which are perceived as the main challenge facing the rural local communities (Kimenyi, 2005).

In the recent past, Zambia made education and health services ‘free’ in order to bring them as closer to the families as possible and thus meeting the health and education needs of the Zambian people. Despite all these efforts made by the ministry of health and education, the health and education sectors have continued to face several challenges and constraints in terms of equity, accessibility, affordability, efficiency and effectiveness. Notably, rural communities and poor urban households have continued to have lesser accessibility and availability of quality health and education facilities and services. This is confirmed by the fact that people have to cover long distances in order to access health and education facilities or services. Other than the above, they also experience a lack of medicines, and high costs of living.

Nonetheless, this set of accessibility, availability and affordability constraints cause the poor communities especially in rural areas not to utilize these health and education facilities and services (Owino, 1997). Therefore, there is need for deeper understanding in terms of the impact CDF has played in the health and education sector to foster rural development as there is often misuse of resources allocated to the running of these funded projects because of lack of accountability, transparency, efficient financial supervision and participation by the target communities (Theil *et al.* 2007). This lack of accountability and transparency eventually paralyzes projects’ facilities and service delivery. The Vice President of the Republic of Zambia, Ms Inonge Wina, confirms to the above, as she bitterly complained about the misuse and lack of monitoring of constituency development funds, which has contributed to poor workmanship (Zambia Daily Mail, 2016). It is with this background that the study seeks to investigate the impact of CDF on health and education sector in fostering rural development in Rufunsa Constituency between the years 2014-2019. The paper also investigates the extent to which these services are available and accessible by rural people at the community level through these members’ participation.

Educational institutions are mandated to use education as a tool for social transformation. The success of a school is measured by the quality of input factors and the students it produces. The success of any educational institution is measured by the

performance of its students in both academic and non-academic tests and this is a product of available infrastructure. Quality education is the hallmark of the MoGE in Zambia and resonating with and aligned to these philosophical / pedagogical conceptions, the vision of the Ministry of General Education (MoGE) is to provide, “*Quality, Lifelong Education for all which is Accessible, Inclusive and Relevant to an Individual, National and Global Value Systems*” (MoGE, 2019). Motifs of equity, accessibility, quality, relevance, inclusivity, lifelong learning, therefore, must be the guiding principles in developing any education system, platform, curriculum, intervention or philosophy in order to sustain these fundamental blue prints for human and national development. On the other hand, the none availability of proper healthcare systems impair any meaningful progress in the education sector.

2.4. The Concept of Rural Development

Rural development, has no universally accepted definition. The term is used in different ways in vastly divergent contexts. It connotes overall development of rural areas with a view to improve the rural quality of life. In short, rural development deals with multi-sectorial issues such as infrastructure, health care, hygiene, education, environment, water and sanitation, food security, governance as well as local income generation. Thus, rural development is a process that aims at improving the standard of living of the people living in the rural areas (Ogao, 2018).

With the result that rural development has the provision of social institutions such as education and health that could provide the catalyst to transform the rural areas, rural development may also be seen as an ideology and a practice because in essence it may imply a broad re-organization and mobilization of rural masses in order to enhance their capacity to improve their lives and with changes consequent upon this. Hitherto, rural development aims at improving the livelihoods by implementing comprehensive development projects, programmes of strategies for rural areas where a majority of people in poverty live. Rural development can also contribute to reduce poverty in urban areas by reducing excessive population influxes from rural areas.

According to the World Bank (2001a) in their paper *Rural Development Strategy*, there is an attestation that rural development must be clearly designed to increase rural production. Thus, there should be improved food supplies and nutrition, together with basic facilities and services, such as health and education. Subsequently, this not only directly improves the physical quality of life of the rural poor, but can also indirectly enhance their productivity and their ability to contribute to the national economy. Therefore, in this study, rural development ensures that social inputs and welfare facilities and services are developed using constituency development funds; these include physical inputs (such as the provision of feeder roads, safe water and rural electrification), social inputs (namely health and educational facilities and service) and institutional inputs such as credit facilities, agricultural research facilities, rural expansion services among others.

2.5. Legal Framework, Management and Utilization of CDF

The 2018 *Constituency Development Fund Act No. 11 (2018)* provides the framework on the Principles of management, disbursement and utilisation of CDF Fund. Act 11 goes further to explain the roles and duties of Minister/s relating to Fund,

Constituency Development Fund Committee, Functions of Committee, and the approval of the project. The CDF Fund shall be disbursed under the direction of Constituency Development Fund Committee constituted as per *part II* of the Act. The CDF Fund consists of monies appropriated by Parliament for the purposes of the Fund. The monies received by way of grants, fees, council contributions or donations should be used for purposes of the Fund specifically intended for funding projects.

All *unutilised funds* shall remain in the constituency account by the local authority and investments shall not be permitted elsewhere, except for funds meant for a project that is cancelled or discontinued. The Act further provides for the formation procedure and the operational structures to oversee the implementation of the fund. The Act also provides for how the CDF projects shall be identified, the number and type of projects to be funded.

And finally, Act 11(2018) *Part IV* extrapolates the penalties of the Fund misuse by stating that, any person who misappropriates funds or assets from the constituency, or assists or causes any person to misappropriate or apply the funds otherwise than in the manner provided in this Act, commits an offence and is liable, on conviction, to a fine not exceeding five hundred thousand penalty units or to imprisonment for a term not exceeding five years, or to both.

This law provides some greater degree of protection of the fund against embezzlement by disgruntled persons in the course of duty and is also instructive on the need for community participation with regard to activities of the fund.

2.6. Theoretical Underpinning

This study was guided by sustainable rural development theory that is hinged on two models or approaches. The two models are *Rural Endogenous Development approach* (IAMO, 2007; Hobo, 1996) and *Participatory Development approach* (JICA, 2004:179). These two models opine that sustainable rural development has four development objectives that need to be put in perspective for improving rural lives. These objectives being (JICA, 2004:180):

- Improvement of economic capabilities of rural people i.e. agricultural income improvement, non-agricultural income improvement, improvement of industries and development of infrastructures.
- Improvement of human capabilities, which entails general health improvement and development of educational standards.
- Improvement of protective capabilities of rural environment, which is conservation of natural environment and natural disaster prevention measures.
- Improvement of political capabilities; which encompasses the improvement of general political capabilities. This implies decentralization and improvement of policy-making capabilities leading to rural community participation in projects that foster rural development.

The foregoing theoretical tenets are of paramount importance in pursuing socio economic development especially in less developed countries where majority people live below the poverty datum line. There is need to re-organize and re-orient the development process in order to guarantee decency, dignity and self-esteem to many rural dwellers as per the prescriptions of these

two models. There is no doubt that the development of the rural areas would also spread to the whole country. For the Zambian set up, the transformed and industrialised agricultural sector hold greater potential for this trajectory if properly invested into and incentivised.

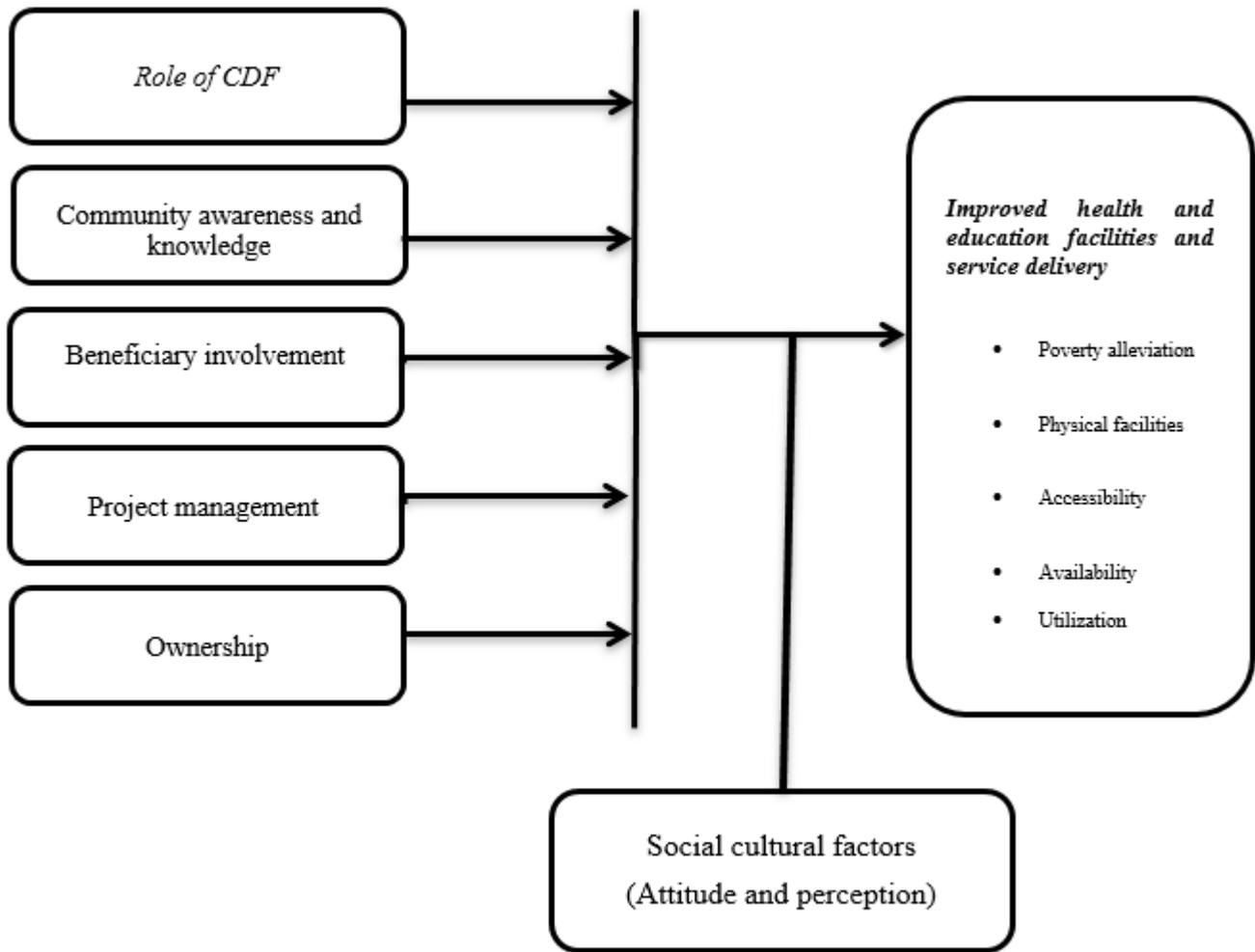
2.7. Conceptual Framework

A conceptual framework refers a researcher's perception of the relationship between variables in the study and shows the

relationship graphically or diagrammatically (Mugenda and Mugenda 2003). The conceptual framework of this study is illustrated in **Figure 1** below showing the relationship between various variables related to success in poverty alleviation in rural areas, and how sustainable Health and education have been impacted after the initiation of CDF in Rufunsa constituency.

Independent Variables

Dependent Variables



Source: Author's Construction (2020)

Figure 1: Conceptual Framework |

Among the facilities CDF can help in providing in the education sector can be classroom block/s, science laboratories, water and sanitation, libraries, computers, electricity connection, school land and transport. In the health sector, CDF can help in

providing ambulance services, drugs, health equipment and infrastructure. This can only be attained if there is consistent disbursement and correct application of the fund; community awareness and knowledge; beneficiary involvement; effective

project management, and project ownership by the beneficiaries. These independent variables affect the dependent variable, which are improved health and education facilities thereby leading to poverty reduction, accessibility and availability of improved service delivery and quality of life. However, better and improved delivery of education and health facilities could also be affected by other factors like political interference from area leaders, community attitude / perception, socio cultural factors like early pregnancy which could lead to school dropout and health status of learners among others. These are captured as intervening variables.

Thus in summation, it is worth noting that, several rural development programs have failed to achieve their desired impact, goals and objectives due to poor organization and implementation strategies. Accordingly, relevant field methodologies that call for effective management of CDF funds especially in the health and education sectors have been inadequate in allowing maximum availability, accessibility and utilization of local rural resources (Kerote, 2007). Kerote further confirms that the CDF committees in rural constituencies do not fully understand vital components of project identification, management, implementation, monitoring and evaluation (Banda, 2019).

III. METHODOLOGY

The study adopted a descriptive analytical research design incorporating quantitative and qualitative methodological paradigms with the questionnaires and semi-structured interviews as main data collection tools. The target population is the totality of all the individual people or objects that possess the characteristics or qualities that are of interest to the researcher (Liu *et al.*, 2014). This study targeted health and education institutions in Rufunsa Constituency. In the health sector, the target comprised all the twenty-four (24) public health facilities ranging from the health centres to the sickbay as beneficiaries of the CDF and the twenty-four (24) health facility administrators while in education the study targeted eleven (11) primary and 3 secondary schools with their fourteen (14) head teachers, which are found in the three wards. The study also targeted one (1) Member of Parliament, three (3) ward councillors from Mwachilele, Nyangwena and Bunda Bunda Wards, five (5) CDF committee members, senior employees and the beneficiaries of the implemented health and education projects / services in the constituency. The sample size of the study was 109 respondents residing in Rufunsa Constituency, who comprised 3 respondents (community members) from each of the 10 health facilities and 10 schools of the three (3) wards in as beneficiaries; ten (10) health facility administrators; 10 school administrators, ten (10) health staff and ten (10) teaching staff. From the civic side, there were one (1) Member of Parliament (MP), three (3) ward councillors and five (5) CDF committee members. Education and health institutions respondents completed questionnaires while civic personnel were interviewed. Purposive sampling was used as a technique to determine education and health institutions' respondents along with civic leaders and service beneficiaries. The data analysis was performed through Statistical Package for Social Scientists (SPSS) for quantitative and content analysis for qualitative data. The researcher personally administered the said instruments on a spot-basis to avoid misplacement, and observed a high degree of ethical standards throughout the study process.

IV. ANALYSIS AND DISCUSSION OF FINDINGS

2.8. Central Government's consistency in disbursing CDF to the Health and Education Facilities

The impact of CDF on the health and education sectors in fostering rural development and service delivery greatly depend on the amount of money the health facility and education has received and the central government's consistency in disbursing CDF to constituencies especially those in rural areas or just developing. In this study, the key informants, the MP, Ward Councillors, Council Chairperson and staff were requested to state how consistent the central government has been in the disbursement of CDF funds allocated to the health and education sectors in the constituency. The same key informants were also asked to state the annual amount of CDF allocated to their constituency in the past five years. According to the MP, the annual average amount of CDF money allocated to each constituency in Zambia either rural or urban was **K1, 400, 000** per constituency. It was equally confirmed that Rufunsa as a constituency had only received **K2, 150,000 (31%)** in the past five years instead of **K7,000,000**, broken down as *K750,000.00 in 2016 and K1,400,000.00 in 2018*. This record corroborated with the Council Accountant's financial records.

According to the MP and some Ward Councillors, the annual CDF received by the constituency in 2019 amounted to K1.4 million and had not yet received any CDF for 2020. However, it was noted that most of the health and education administrators were not aware of the amount allocated to their facilities. This was attributed to the fact that almost 90% of the health and education facilities had not received any CDF funding for the past five years. Most of these administrators lamented that they had been applying for CDF but unfortunately they were not being considered. And the researcher observed that many health and education related projects were in incomplete state necessitated by the lack of funding allocation to respective sectors.

The key informants further stated that the constituency receives a fixed amount of money from the central government, which was recently raised to K1.5million. It was also discovered that in Rufunsa constituency, there was no fixed allocation to the Health and Education facilities. Therefore, very few Education and Health facilities have benefited from CDF funds. Moreover, most key informants interviewed raised a concern on the issue centred around tightening controls on the management and utilisation of the fund and enhancing accountability measures through enacting the CDF Act as opposed to managing it through the Local Government Act. This concern was raised because there was a feeling that the lack of information on the amount allocated to the education and health sectors indicates lack of transparency and transparency as most of the education and health administrators and other key stakeholder did not know the amount that the constituency had received for the past five years. Conclusively, the key informants and all beneficiaries' attested that the central government was not consistent in the disbursement of funds and that in few times that the funds were sent, they were delayed. Therefore, to foster sustainable rural development, the government of Zambia must put CDF allocations and funding at the top of the national agenda and should be the fundamental principle which underpins all national and rural policies that seek

to mitigate underdevelopment through equal educational and health investments in enhancing people’s wellbeing in rural setups.

The key objectives of the CDF fund are to fund projects with immediate social and economic impact of the citizens, with a view of improving lives, alleviating poverty and bringing general development (IEA, 2006). According to Kimenyi (2005), CDF is designed to fight poverty through the implementation of developmental projects at the local level, and particularly, those that provide basic needs such as education, healthcare, water, agricultural services, security and electricity. It must be noted that, up to date very few health posts and schools have been built and equipped through the CDF funds. CDF funds are there to help decongest larger district level hospitals (Ministry of Health, 2007). Furthermore, operational structure of the CDF allows local people especially in the rural communities to make their own expenditure decisions that reflect their tastes and preferences to maximize their welfare and benefits.

2.1. Community Participation in CDF Projects

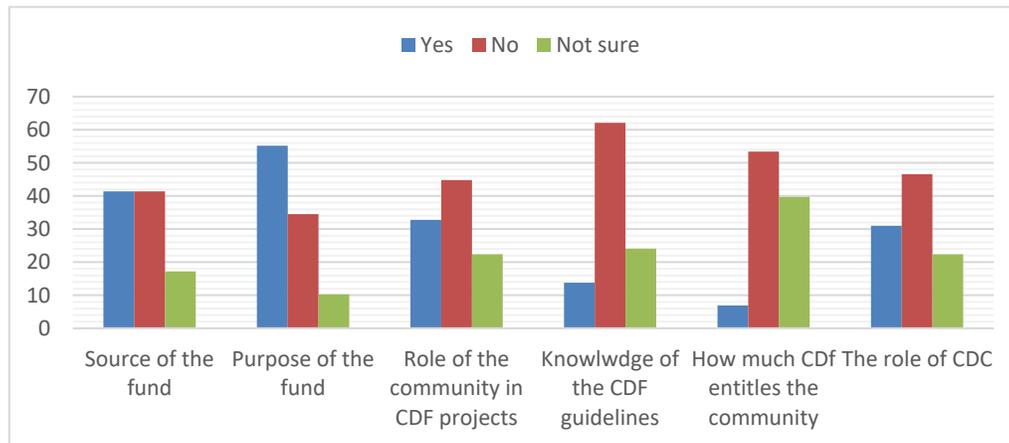
According to Craig & Mayo (1995), development can only be meaningful if the beneficiaries are allowed participation in community projects. Therefore, community participation, defined as a strategy for involving society in matters which concern them, is very vital in decision-making and sustainable rural development. This participation should be at all levels, that is from project identification right through to project implementation, monitoring and evaluation. One of the aims of the study was to examine the extent of community participation in the selection and implementation of projects on which CDF is utilised. In order for the researcher to establish whether a study into CDF would draw

meaningful conclusions, it was important to discover if the community members have the knowledge and awareness if CDF existed in their communities and if it has helped in the education and health sectors in the past five years. The local endogenous people have the right to know the existing CDF projects in their local communities (their wards), for effective and relevant participation to take place. Community participation is likely to be effective when adequate information about all concerns on which their decisions and participation are required. Community awareness and knowledge can only be made obtainable through information dissemination policy, using all available media such as meetings, participatory sessions, radio, pamphlets and drama among others (Kumar, 2002).

The data obtained showed that out of 10 health staff only (10%) have never heard of CDF while (90%) were aware of CDF. On the other hand, 100% of both the education staffs and administrators have heard of CDF. However, from the beneficiaries’ side, the results show that 40 out of 58 beneficiaries have heard about CDF while 18 were not aware of CDF. The findings show that majority of the respondents knew or had heard about CDF as demonstrated in the information above. The higher level of respondents’ knowledge of CDF could be linked to higher civic education knowledge that go hand in hand with the level of awareness coupled with the fact that CDF disbursement is their engagement. This can also be linked to the fact that under the new *CDF Act*, community knowledge and awareness is prerequisite in order to achieve the desired results.

Figure 2 below shows responses of community members’ knowledge, awareness and participation in and about various aspects of CDF.

Figure 2: Responses showing Community Knowledge, Awareness & Participation in CDF Aspects



Source: Survey Data (2020)

Figure 2 above reveals that the majority of the respondents (40%) indicated that they did not know the details surrounding the source of CDF while 40% again agreed to have known the source of the fund. Whereas 55% knew about the purpose of the fund, 35% did not know, 10% were not aware at all of the purpose of the fund. The bigger percentage of the beneficiaries (45%) were not aware about the roles of the community in CDF project whereas 60% did not have knowledge of the CDF guidelines. Furthermore,

majority of the respondents did not know how much CDF their constituency was entitled to.

Therefore, from the above analysis, most of the beneficiaries were unaware of the channels of disbursement of the fund and what the fund was intended for. The level of knowledge about the source of the fund was very low by the beneficiaries. The interview with beneficiaries revealed that the entire education and health facilities administrators and staffs did not know how much

they were entitled from the fund in their constituency. Most of the people agreed that they did not know the roles of the constituency development committees and how CDF was appropriated and disbursed. The ward councillors and CDFC attested that most of the local people do not know about the new CDF guidelines as they are still working on it. However, the levels of knowledge about basic information concerning CDF were found to be quite high. One beneficiary stated that:

"I have heard of CDF and it is a good thing but it is not doing enough. I don't know where the money comes from but the MP brings it here to help the people and uplift their living standards" (View expressed by a beneficiary in Nyangwena ward on 7 May 2020)

This lack of knowledge by many beneficiaries on the source of CDF in the community points out the limited knowledge that the people at grassroots have with regards to this participatory tool of development. Therefore, there is need for more civic education and sensitisation about central government and the disbursement of CDF led by MPs, councillors and the district council that should involve the local community.

The study also wanted to know the level of **community participation in decision making** for the improvement of health and education facilities service delivery and if they were aware of how decisions were arrived at. With this in mind, respondents were asked to respond to whether they had been involved in various selection and implementation of CDF projects. Respondents were also asked to indicate how the decisions were made and how many meetings they had with the number of community members in attendance. The response indicated that the majority of the beneficiaries (77.6%); 80% Health administrators; 90% health staff; 60% education administrators, and 80% of the education staff are generally not aware of how decisions were arrived at in funding the health and education facilities using the CDF. Results further confirm that the entire sampled group was not sure who made the decision on improving either the health or education sectors in the constituency. However, 22.4% of the beneficiaries, 80% of the education key informants and 70% education staff revealed that some meetings were held attended by between 80 to 150 community members. However, only education facility staff responded much in affirmation that the meetings were held whereas the health facility staff response was low. This entails that there is need for community meetings to be made more public and all other stakeholders to be invited to these meetings.

In Zambia, Members of Parliament have CDF money overspent, misappropriated and misapplied from the CDF bank accounts. This leads to incomplete projects and lack of beneficiary benefits. *A case in point is the case of Rufunsa Constituency where about K1.3million was fraudulently withdrawn and diverted by the officials of the Ministry of Local Government and housing in December 2013 (Zambia Daily Mail, 2015).* Similar cases have led some of the other MPs to lose or fail to retain their seats. This further points out that the success of the fund is pegged on the character and the commitment of the area MP to use the fund for general development in his/her constituency as prescribed by the Act.

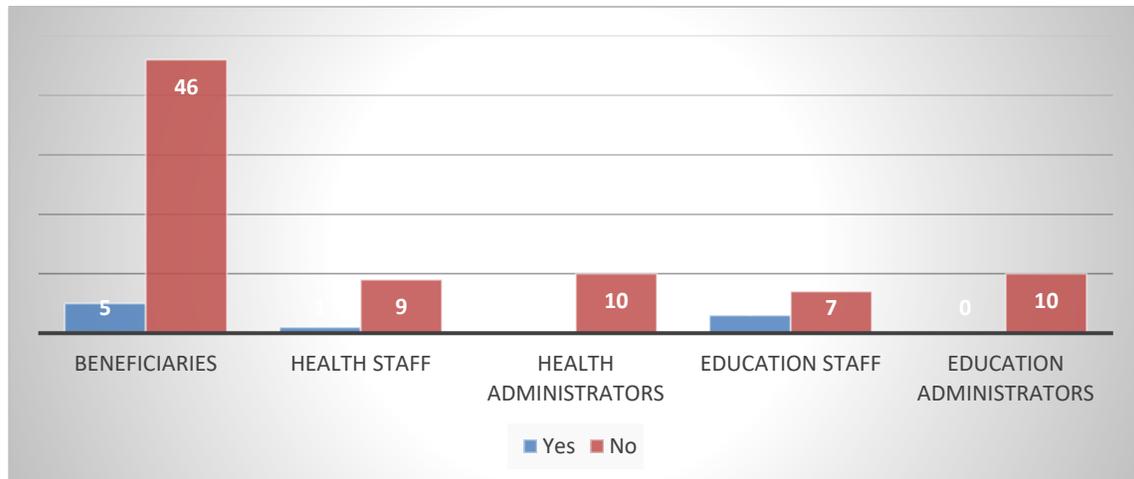
According to Okungu (2008), a political analyst, 70% of the constituencies have reported mismanagement, theft, fraud and misappropriation and that CDF issues are of a political nature.

Ongoya and Lumallas, (2005) are of the view that, CDF has the potential of being used by politicians to build their reputation in their constituencies and mobilize political support. As it were, the fund has no specific development agenda; hence, it stands out as a political tool (Gikonyo, 2008).

Community participation in monitoring and evaluation is generally a vital ingredient used in determining effective implementation of any development project and the quality outcomes. Referring to Mwangi (2002), beneficiaries may determine the success or failure of any project. For Mwangi (2002), involving the community, the development workers stand high chances of identifying the vital needs of the community as well as the solutions to the challenges that could act as stumbling block to the success of their intervention. To this end, the entire respondents were assessed whether they have ever participated in the implementation, monitoring and evaluation of projects funded by CDF in the health or education sector, or if they had previously participated in one or more. **Figure 3** below gives details of the findings. The distribution illustrated in figure 4.2, very clearly shows that the majority of the beneficiaries, Education and Health administrators and staffs were not engaged in the implementation, monitoring and evaluation processes. The study also reveals that out of 51 beneficiaries who responded to this particular question, 46 said they have never participated while 5 said they had participated. 10 out of 10 health and education administrators, 9 out of 10 health staff and 7 out of 10 education staff declined to having participated in the monitoring and evaluation process. However, only 1 health staff and 3 education staff said yes to participation only in implementation, monitoring and not evaluation of CDF projects. This raises an issue on the level of competence needed in implementation, monitoring and evaluation process. Ordinarily, one would expect more of Health and education facility administrators and staffs to be involved since this is a health and education concern but this is not the case in Rufunsa Constituency. This might be the reason why projects in the education and health facilities do not meet the standards for the purpose i.e. quality and extent of improvements. Furthermore, if the beneficiaries, health and education administrators and their staff are not involved in the implementation, monitoring and evaluation processes, it implies that community members who are the major beneficiaries of the CDF projects have been side-lined as confirmed by results in figure 3 below.

Conversely, it is a fact that members of the community are not welcomed in the technical aspects of monitoring and evaluation processes. The results for not involving community members may be attributed to the fact that project evaluation requires specific technical knowledge, which may be missing among most of the beneficiaries and some Health and education Facility Administrators and staff. Mulwa (2007) agrees to the above by stating that an independent and competent body should carry out project evaluation in order to ensure a professional monitoring and evaluation process. The approach is meant to assess the consequences of the project on the beneficiaries such as whether the project is the right one for the beneficiaries or not. The government needs to have independent structures at the grassroots to monitor the progress of developmental projects and put in place strong measures to curb corruption and misappropriation of CDF funds.

Figure 3: Level of Community participation in Implementation, Monitoring and Evaluation of CDF projects



Source: Survey Data (2020)

According to Paul (1987), community participation refers to an active process by which beneficiary client groups influence the direction and execution of a development project with a view to enhancing their well-being in terms of income, personal growth, self-reliance or other values they cherish. From the Zambian context, Caritas Zambia (2016), in agreement with the foregoing, observed that community participation in the CDF projects, in most cases, was not in line with the provisions of the CDF Guidelines. This variance in the levels of participation has resulted in partisan attitudes which tend to influence project identification, selection and implementation. Since the projects are not prioritized within the local rural communities' needs, and also that the CDF amounts are inadequate as constituencies are large in geographical size, it is noted that the projects do not benefit the rural communities (Caritas Zambia, 2016). World Health Organisation (2002) commenting on both health and education in improving the lives of rural people, indicate that rural development in health and education sectors can only succeed through concrete and effective community action. At the heart of this process is the empowerment of communities, their ownership and control of their own endeavours and destinies (WHO, 2002). Thus, beneficiary participation offers new opportunities for creative thinking and innovative planning and development.

Capacity building and training in rural communities about CDF development projects to arouse awareness and knowledge is of utmost importance. Training is a process by which individuals gain knowledge, skills and attitudes that are helpful in shaping the lives of the people. Imparted skills and knowledge are important in solving emerging problems and challenges especially in health and education (ZIPAR 2015:3-4, Banda 2019). Gitonga (2010) enlightens that when the rural members of a society increase their personal knowledge, awareness and management of resources, rural sustainability and just distribution of resources will be attained. Through the acquired knowledge, abstract theoretical constructs are tested with real life challenges, hence the educated always take control of events with courage. Education brings about awareness and knowledge thus moulding the behaviour of individuals into a desired state. This offers opportunities for

innovation and creativity necessary in addressing both current and future challenges.

2.1. Impact of CDF on Health and Education Service Delivery in Rufunsa Constituency

2.1.1. Education Sector

One of the ways of determining rural development in the study area was to establish if CDF has contributed to education facilities / infrastructure development in the past five years. Existence of rural education facilities and also the distance to the nearest learning institution are major factors in curbing illiteracy. The study focused on the availability and accessibility of schools to rural communities. To this end the study targeted the education administrators and Staff to indicate the distance to the nearest school or education facility as they are in the better position to state absolutely.

On the question of *distance to the nearest school*, it was very evident that pupils need to walk long distances (above 10 kilometres) to the nearest school as most education facilities were far away from their homes. In terms of the nearest school, 60% of the education administrators, 40% of education staff and 32.8% of beneficiaries indicated that the nearest school was 5-10 km away whereas 20% education administrators, 30% education staff and 19% of the beneficiaries said that the nearest school was between 0-5km away. This indicates that schools were not near pupils' homes. Further interrogation of the key informants during the study indicated that the few schools that were available lacked the necessary tools to foster better service delivery of education. Most schools lacked manpower (teachers) and facilities such as furniture or desks, computers, essential text books (English, Mathematics and Science) to offer quality education to students. On teachers in schools, 60% of the education staff said that the teaching staff's facilities were not enough. This is evident as the teacher ratio for education staff is 1-125. This is true as the researcher found that at one school, Kalungula primary school, there were only two teachers i.e. the Head Master and one teacher. Thus the above ratio could be true. Most schools in the Constituency had not received teachers, thus, continued experiencing shortages. The availability of teachers in the sampled

3 secondary and 11 primary schools were another indicator of education quality status of rural schools. As such from the teacher student ratio of 1-125 where it is supposed to be 1-45 as normal class room. This shows that teaching staff in most learning institutions were not enough implying that there was a challenge when it came to teaching students due to a wide range of teacher-student ratio.

The study further established that most schools in Rufunsa area did not have enough reading materials as findings show that

50% of the teaching staff stated that 1 book is shared among 10 or more pupils (Ratio: 1-10) hence hindering effective learning. The reasons for lack of enough reading materials include government’s failure to purchase books in the schools, the schools had not received any CDF towards improving education service delivery and parent’s inability to buy their children books due to high rates of poverty. Furthermore, more schools lacked computer classes and computers too.

Table 1: Are Education facilities enough after introduction of CDF?

Facility	Enough	Not enough	Shortage	Don’t know
Classrooms	3	25	13	17
Laboratories	1	19	25	11
Libraries	1	14	23	20
Offices	2	24	12	18
Dormitories	2	4	33	20
School vehicle	1	2	35	20
Computer laboratory	1	4	33	18

Source: Survey Data (2020)

The entire sampled population who are beneficiaries and education staff said that classrooms in schools were not enough. Twenty-five (25) beneficiaries and 50% of the education staff said that the classrooms were not enough. The essential science laboratories, home economics, library stocks, functional computers and multi-purpose halls were also not enough. Furthermore, sporting facilities and equipment like netballs, footballs, chess boards were not enough, in fact in all primary schools sampled. This implies that the existing education facilities

in Rufunsa Constituency did not meet provision of quality education service delivery to students.

2.8.1. Health Sector

The study also investigated if CDF has helped in bringing health facilities closer to the homes of the rural people through reduction on the walking distance by the patients in the constituency. Both the beneficiaries and the health staff were asked to indicate the distances to their nearest health facility. **Table 2** below shows the results:

Table 2: Distance to Nearest Health Facility (In Kilometres)

Distance	Beneficiary		Health Administrators		Health Staff	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
0-2	9	15.5	2	20	3	30
2-5	11	19	2	20	-	-
5-10	22	37.9	4	40	5	50
10 above	16	27.6	2	20	2	20
Total	58	100	10	100	10	100
Average		7.8		7.4		7.6

Source: Survey Data (2020)

Analysis in **Table 2** above indicates that majority beneficiaries 39.7% walked between 5-10km to access the nearest health centres and health posts for treatment. Just like the 39.7% beneficiaries who said the distance to the nearest health facility was 5-10km, the health facility staff, about 50%, and 40% administrators also stated that the distance to the nearest health centre or post for people was between 5-10km. This can be said to be the true picture because the health staff know exactly where the next health facility is located and also the boundaries of the health facilities. Therefore, average walking distance to health centres is 7.8 kilometres for the beneficiaries while the average walking distance from the health administrators is 7.4 kilometres with the average walking distance to the health facilities staff being 7.6 kilometres.

According to the Ministry of Health, they recommend that, every after 5 kilometres there should be a health facility. This compares favourably with the World Health Organization’s recommendation of 2.5 kilometres to a nearest health facility in the rural areas. Thus based on the above analysis, the people of Rufunsa constituency have to walk on average more than 7 kilometres to access health care services. Additionally, the entire key informants agreed that there is shortage of health staff and health facilities (like Chiyota and Kazemba health posts, there is only one trained health personnel on each health post managing all health related work). Because of shortage of health staffs, most patients take a long time before accessing treatment, which is detrimental to sustainable health living.

Furthermore, in evaluating the impact of CDF on health status of people in Rufunsa Constituency, the study sought to establish whether the various *health equipment* like, ambulance services, drugs, medical equipment and machinery, health workers, maternity wards and mortuary services in government

health centres after the introduction of CDF were available and accessible by the local people. Towards this goal, **Table 3** gives the summary of the findings on the availability and accessibility of health facilities equipment.

Table 3: Showing the beneficiary response on the Availability and Accessibility of health equipment's

	Available		Not available		Partially		Accessible		Not Accessible		Partially	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Ambulance services	21	51.7	20	34.4	2	3.4	15	25.9	9	15.5	3	5.2
Drugs	21	36.2	10	17.2	11	18.9	16	27.6	10	17.2	4	6.9
Medical Equipment	12	20.7	19	32.7	10	17.2	8	13.8	13	22.4	7	12
Health Machines	12	20.7	23	39.6	5	8.6	4	6.9	16	27.6	7	12
Health Staff/Workers	25	43.1	10	17.2	8	13.8	12	20.7	9	15.5	6	10.3
Maternity Wards	26	44.8	13	22.4	1	1.7	18	31	9	15.5	1	1.7
Mortuary	2	3.4	23	39.6	-	-	2	3.4	24	41.4	2	3.4

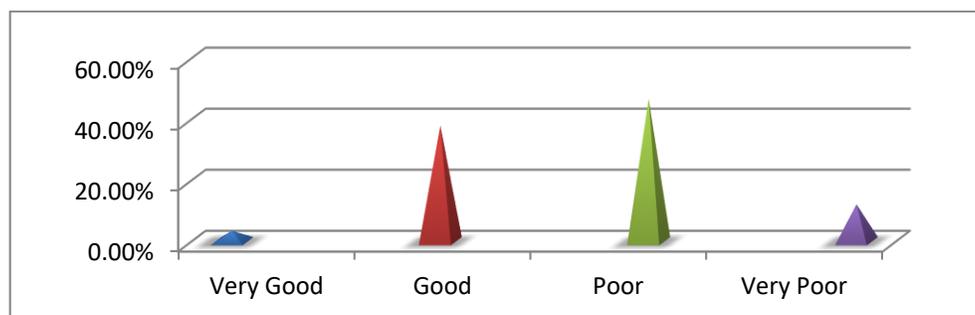
Source: Survey Data (2020)

The above summary was done due to the fact that most developing countries and rural health facilities have challenges to availability and accessibility of quality health services delivery. Every health centre needs to have ambulance services in attending to emergency cases of patients. However, during the study majority of about 51.7% of the respondents revealed that there are ambulance services whereas 34.4% of the respondents said that ambulance services lacked in health facilities. In fact, the health staff said there is only one ambulance that covers the three zones in the constituency. This means that in case of sickness, residents looked for their own means of transport to take the sick to the nearest health centres or hospital. The one ambulance service did not have enough first aid equipment and this could lead to death of some patients before they get to the health centre or hospitals. The reason for one ambulance service is due to the capacity of health facilities, which are mostly small and do not handle complex health cases. Although ambulance services still lack in health centres, the services offered have slightly improved.

The study further revealed that there were few health practitioners attending to patients especially in the health posts.

This was reported by 81.5% of the respondents. This implies that most health challenges among the residents in the Constituency were not addressed. Only 19.5% argued that health practitioners were enough and available to attend to patients. On the mortuary, medical equipment and machines in the health centres, 39.6% of the respondents said that there are no medical equipment and machines while 20.7% said that they were available in hospitals. It must be noted that during the research, it was discovered that the whole Rufunsa district has only one small mortuary from Mpanshya Mission Hospital. This means that most of the health facilities had inadequate medical equipment and machines. In a nutshell, the health status of residents in the Constituency were mildly improving after the introduction of CDF. The public health facilities available by that time did not have adequate building or structures, health workers, drugs, and ambulance services to facilitate service delivery to the residents of the Constituency. On the other hand, the influence of CDF allocation on health care was assessed by asking the beneficiaries to rate the health care services in the health facilities in the past five years and **figure 4** gives a summary of the findings.

Figure 4: Beneficiary responses on the Rate of Health Care Service Delivery in the past five years



Source: Survey Data (2020)

Figure 4 above gives a summary on the health care and service delivery status in Rufunsa Constituency. The beneficiaries are of the view that the health services have not been very good as

46.6% said that the health care service were poor as compared to 37.9% of the beneficiary who responded that the health care services were good. Only 3.40% said that health facilities were

very good which is contrary to the 12.10% who said that the health care services were very poor. Generally, the health service can be said to be poor. This, therefore, means that people concerned with the management of the CDF still have a lot to do so that all parties can be happy.

The study was also interested to understand how health facility administrators and staff in the Constituency perceive

health services provided in government health facilities in the Constituency since the introduction of CDF. Thus, both the health administrators and health staff were asked to rate the availability and accessibility of the health facilities in the past five years. The responses are summarized in **Table 4** below:

Table 4: Rating of health services in the constituency after introduction of CDF

Response	Health ADM		Health staff	
	Frequency	%	Frequency	%
Low 0-39%	2	20	1	10
Moderate 40-60%	5	50	7	70
High 70-80%	3	30	2	20
Excellent 80-100%	-	-	-	-

Source: Survey Data (2020)

As shown in table 4.2 above, five health administrators 50% and seven health staff 70% were of the view that the services offered in health facilities are moderate (40-60%) to high (70-80%) respectively. However, 2 health administrators 20% and 1 health staff 10% maintained that the services were low (0-39%) and none of the health administrators and staff agreed that the services offered in the facilities were excellent. The data indicate that health services offered in these health facilities were moderate thus has improved since the introduction of CDF and in the past five years. On the contrary to the argument that CDF has not improved health services in the area of study, it is attributed to insufficient and poor infrastructure (buildings and roads) in the rural areas, lack of ambulance services and insufficient drugs in the health facilities as discussed above.

The study revealed that health facilities were not enough in the Constituency. These facilities also did not provide comprehensive health care and service delivery because they had insufficient health machines, health staff and workers, maternity wards, mortuary and important medical equipment. Therefore, inadequate buildings posed a great challenge in the health sector in the Constituency. Nevertheless, it is not surprising that respondents for those facilities were quick to note some little improvements ranging from increased number of mother's shelters and drugs for health facilities. Accordingly, 30% of health administrators and 40% of the health staffs said that, CDF has been used to improve the maternity ward and mother's shelters for some health centres. Most health facility equipment are not enough, only 60% administrators and 40% health staffs said that dispensary and drugs in health facilities had improved. Number of new wards, laboratories, additional medical personnel (human resource and wards had not improved at all by the CDF).

V. CONCLUSION

Education and health services stand at the centre of human development and their availability, accessibility, utilization, affordability and equitability are of paramount importance. In the case of health and education facilities and service delivery in Rufunsa Constituency from the perspective of CDF funding, there

is a clarion call for government's enhanced consistency in prioritising the allocation and consequential timely disbursement of the fund to the constituency for collectively agreed upon community development ventures annually. The current scenario where the constituency has only received twice (totally K2, 150,000.00 i.e. 31%) out of five times for the past five years leaves a lot to be desired and clearly explicates the glaring underdevelopment documented herein. By implication, the constituency has been robbed of K4,850,000 deserved development fund for the community's socio economic well-being. On the other hand, community involvement in development projects is the surest strategy of achieving sustainable rural development. The beneficiaries should be involved in projects identification, design, implementation, monitoring and evaluation processes though this requires capacity building, which should be factored by planners and policy-makers including civic leaders. The knowledge and awareness of CDF guidelines, channels of funds and when the funds are available is important information which the community must not be deprived of pursuant to the CDF legal framework as enjoined in *Act No. 11 of 2018*. The selection, planning, preparation and implementation of development projects should centralise the beneficiaries as owners of the same. This will make the CDF resources bring about desirable transformation through the health and education sectors in the constituency. These issues also call for attention to address the budgetary implications in facilities and servicing which foster rural development in Rufunsa Constituency.

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The Role of Pedagogical, Environmental and Socio Economic Factors in Pupils' Retention Rate in Public Primary Schools in Lusaka, Zambia

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Abstract- This was an empirical study purposed to analyse the role of pedagogical, environmental and socio economic factors in public primary schools' pupil retention in Lusaka, Zambia against the resounding concern about the reduction in number of pupils who were able to transition to upper levels after enrolment. The objectives of the study were: to describe pedagogical processes which lead to low retention rate among public primary school pupils; to explore school environmental factors which contribute to low retention rate among public primary school pupils; and to analyse socio-economic factors responsible for low retention rates among public primary school pupils. A survey method was employed incorporating a descriptive paradigm. The questionnaires were distributed to 10 selected public primary schools in Lusaka based on the District Education Board's 66 currently established public primary schools list as at 2020. The study targeted a total of 100 respondents out of which 92 responded successfully. The respondents comprised head teachers, deputies, school counsellors, senior teachers, class teachers, and school administrators. Questionnaire responses were subjected to analysis using excel and SPSS to gain in-depth understanding of the phenomena with the results being presented in charts, figures, tables and graphs while content responses were presented in text format. The key findings were that pedagogical factors including poor teaching approaches, methods / techniques, teacher qualifications, teacher unpreparedness and teacher attitude played a critical role in contributing to low retention of pupils in public primary schools. Environmentally, it was established that factors such as lack of adequate facilities / resources in schools e.g. text books, proper water and sanitary facilities, teacher availability, class room, furniture, school outlook and surroundings contributed to the problem. On socio economic fronts; family poverty, nutrition, child labour, loss of parent/guardian were topping the list as being prohibitive to children's perseverance and persistence in their education radar. Some Parents/guardians were said not to be able to buy school shoes, uniform and pay other minor user fees like sports or PTA fund etc, which led to some School Administrators / Head teachers sending away such children despite government policy not to chase any child on such grounds. Compounding the situation was the fact that government's policy interventions such as introduction of feeding programmes, sponsorship of orphans and

vulnerable children have been negatively affected by the declining education financing levels from central government since 2016. The resultant effect overall is an increase in the number of children out of school from over 195,000 in 2015 to over 800,000 in 2019 as national aggregates. The study, therefore, recommends that educationists and policy makers need to consider the issues raised herein with great precaution and urgency so that the resources invested in the education sector will be realised with a dividend.

Index Terms- Role, Pedagogic, Environmental, Socio Economic, Retention Rate, Primary School Pupils.

I. INTRODUCTION

Globally, governments are responsible for the education of their citizens as well as the achievement of the intended purpose of education as bases for peace, socio economic development, harmony etc. (UNESCO, 2018). This is because education is considered to be a panacea to socio economic upheavals, among others. Zambia's Education System consists of early childhood education (ECE), primary, secondary and professional or tertiary levels. The primary level, which is the concern in this discourse runs from grades 1 to 7. For the majority this is the basic form of education that is attained and paves a way for future achievements in the academic life of the young children. In addition to the formal system, there is a non-formal education system that operates to serve, among others, displaced persons, school-aged children who have either dropped out of school or have never attended formal school, geographically isolated children, street and working children. *The concept survival rate entails knowing the number of pupils who will complete the primary level of education up to the 5th grade. This rate is calculated using the constructed cohort system and forecasts the likelihood that a pupil will survive to a grade assuming the current pattern of dropout and repetition rate* (Cameron & Laurie, 2005). This rate is necessary in the education sector as it helps policy makers in the education sector know at what level they are facing challenges in terms of primary education. However, there are factors that account for low survival rate in public primary schools' pupils and these range from those factors that originate from the school teaching program, the school environment itself

as well as the society in which those pupils live. Hence this delicate level needs more attention from both the government and other stake holders as it impacts more on the future development of a country. However, there are many challenges encountered in this stage which in worst scenario leaves the education of the child compromised or halted. In their study, UNICEF estimated that 68.8% of pre-primary age children were out of school in 2014, which leaves much to be desired as it hinges also on the moral fiber of the Zambian society. It is, therefore, important that the factors which contribute to such be identified and approached with the tools necessary for the development of holistic education system. Zambia has been affected by such factors which has led to low survival rates of primary school pupils and this impacts negatively on the education of the young population of the country, thereby leading to slow development of the nation. It is noteworthy that the Government of the Republic of Zambia has put up sufficient policies, standards, instruments and domesticated international conventions aimed at guaranteeing quality education in the country but there seems to be some pertinent factors which pull out of schools these children between grade 1 and grade 5.

1.1. Problem Statement

The education sector in Zambia generally faces challenges which in some cases result in not fully attaining the intended goals. Amongst these at primary school level is the low retention rate, which measures the rate of whether a newly entrant pupil will complete lower primary level i.e. grades 1 to 4. Pupil retention in public primary schools remains the biggest challenge because it is not certain whether pupils entering grade 1 will eventually complete lower primary level (grade 5). This negative progression rate has an impact on resources that are invested in this sector. For instance, it was estimated that 84,880 pupils, or 16.7% of the total of 508,264 Grade 1 entrants in 2009 will drop out before completing Grade 5 and the investment for them will be wasted, (MOE, 2009). In terms of gender, the female retention rate to Grade 5 was lower than that of male even though more girls entered Grade 1. The number of pupils to whom investment will be wasted is nearly 10,000 more for girls than boys (boys 35,476, girls 45,150) (MOE, 2009). In Lusaka province, the figures were higher in repetition rate, dropout rate and retention rate, whereas transition rate was significantly lower than the average. There are many factors which lead to such for instance attendance rate of orphans has been lower than the children with parents by 10-15% (World Bank, 2006). According to the research in Central province, many orphans did not go to school every day and could not concentrate on classes even if they attend because of hunger, all of which resulted in low retention rate and high dropout rate (IOB, 2008). This process of pupils' low retention rate is ongoing as most of those who do not attend school are children who have enrolled but who have crossed the threshold from regular attendance to regular absence. The push or pull factors in both schools, communities and households are among factor which lead into low retention rate. This is an under-researched area even though the problem is prevalent. Knowledge around this can help illuminate some of the complexities around it and bring new insights to policy makers and educational practitioners as the number of children out of school has continued to swell from

195,000 (Education Statistical Bulletin) in 2015 to over 800,000 in 2019 (Lusaka Times, 3rd May, 2019).

1.2. Study Objectives

1.2.1. Main Objective

To analyse factors accounting for low retention rates among public primary school pupils in Lusaka, Zambia.

1.2.2. Specific Objectives

- (i) To describe pedagogical processes which lead to low retention rate among public primary school pupils in Lusaka District.
- (ii) To explore school environmental factors which contribute to low retention rate among public primary school pupils in Lusaka District.
- (iii) To analyse socio-economic factors responsible for low retention rates among public primary school pupils in Lusaka District.

II. THEORETICAL REVIEW OF LITERATURE

2.1. Zambia's Demographic Overview

The population of Zambia as at close of 2018 stood at 17.1 million people compared to about 3.45 million people at independence in 1964. Partly because of the country's high fertility rate, the population is growing at a rapid 3.3 percent per year resulting in the population doubling close to every 25 years (Masaiti *et al.*, 2018; World Bank, 2018; CSO, 2017). Zambia is experiencing a large demographic shift and is one of the world's youngest countries by median age. The World Bank (2018) projects that this trend is expected to continue as the large youth population enters reproductive age, which will put even more pressure on the demand for jobs, education, healthcare and other social services. In terms of age structure, the population under the age of 15 years and below accounts for about 50 per cent while those under the age of 35 years' account for 70 per cent of the Zambian population (Masaiti *et al.*, 2018). In terms of figures, 8,158,011 are young people under the age of 15 years (4,094,205 males / 4,063,632 females), 8,876,572 are persons between 15 and 64 years old (4,461,085 males / 4,415,487 females), 435,888 are people above 64 years (186,934 males / 248,954 females) (World Bank, 2018) (CSO, 2017). *In other words, the country overall has a young population which makes the provision of educational services to this population to be of strategic importance to government* (EFA, 2015).

2.2. Zambia's Education Policy Frameworks

A policy is a statement of intent or guide to courses of action meant to realize intended benefits. In other words, it is a strategic use of resources in dealing with human challenges. The Zambian education sector has progressively devised and implemented various policy interventions in a bid to enhance service provision and delivery to the satisfaction of clients. Policies are also crucially important in helping monitor and evaluate intended goals and objectives. Masaiti *et al.*, (2018) highlight five as the major policy documents from 1977 to date.

The first one being the *Education Reform, Proposals and Recommendations document of 1977*. The major undertaking of

this policy was to try and address the distortions and deficiencies of the colonial education system which trained Africans to serve as labourers but failed to meet the needs of Zambians in the context of the new social, economic and political dispensation. It aimed to create an education system which met the needs and aspirations of Zambians and functioned as a powerful instrument for development of an independent nation (MoE, 1977). The Ministry noted that 'Education is a social institution which will continue to reflect the characteristics of the Zambian society' (ibid). From the spirit of the document, the ministry was aware that the achievement of universal basic education would require significant resources i.e. time, infrastructure, financial, material etc. The policy also opined the need for additional classroom space, teacher recruitment and consistent annual recurrent funding as basis for meeting the demand for quality education.

The second document was *Focus on Learning*, which concentrated on the development of primary education. It stated that, 'the basic national policy in the education sector is to provide every eligible child with good quality education in Grades 1-7. The policy aimed to improve access, equity and efficiency and provide quality education through the rehabilitation of existing schools, building new ones, training education managers and procuring and supplying educational materials to schools. The policy emphasized the need for broad-based resource mobilization strategies to ensure its effective implementation (MoE, 1992) (Masaiti *et al.*, 2018).

The third and current education policy is the *Educating Our Future* document of 1996 with its primary focus on quality, efficiency, equity, revitalized partnerships, decentralization and democratization. It aimed at ensuring that by 2015 every child should have had access to nine years of basic education (MoE, 1996) and prioritised literacy and numeracy in schools as critical to meeting the policy's blue prints. However, Masaiti *et al.*, (2018) regrettably state that this policy's effective implementation has met serious glitches as learner achievements are still very low. In a bid to ensure accessibility, affordability, equity, relevance and quality of education service provision to all eligible persons, the government of the Republic of Zambia enacted a **Universal Free Primary Education Policy** was envisioned to exponentially increase equity, affordability, quality, relevance and accessibility to education by all and promote socioeconomic well-being of all citizens, and to achieve a good quality of life for everyone (Phiri, 2015; GRZ, 2002; and Ministry of Education, 2003).

In 2006, Zambia enacted a *Vision 2030* which envisions the country to be, "a prosperous Middle-income Nation by 2030." This document was declared as reflecting the collective understanding, aspirations and determination of the Zambian people to be a prosperous middle-income nation and has been the accepted by successive governments to date as a standard of the country's progress, focus, actions etc. This document equally recognizes the central role of education in achieving its blue print objectives and gave strategic focus on what needed to be done in the education sector in the exodus to the 2030 promised land. It envisions among others, reduced pupil/book ratios, increased enrollment rates, reduced gender parity index etc.

The foregoing indicated policy documents highlight the country's long and progressively engrained desire to provide localized and quality education as a formidable foundation to the country's socio economic development. As a matter of fact, the vision of the Ministry of General Education (MoGE) is to provide, "Quality, Lifelong Education for all which is Accessible, Inclusive and Relevant to an Individual, National and Global Value Systems" (MoGE, 2019). With the current policies tilting more towards accessibility, equity, efficiency and relevance, there is an equal emphasis on the need for sustainable financing, among others, in order to meet these education benchmarks. What is so clear in the current policy is that the learner achievements during the subsistence of this policy are very low, which claim constitute a fundamental indictment and requires investigation for root cause. While the policies, among others, purposed to ensure provision of basic education by 2015, the picture on the ground seems to suggest that the number of children out of school is on a steady increase from 2015 (which is the direct opposite) (ESB,2015, and Lusaka Times, 3rd May, 2019).

2.1. Exploring Low Retention Rate Factors

Admittedly, there are mosaic factors which could be responsible for low retention rate among public primary school pupils but this study focuses on three broad categories, namely: pedagogical, environmental and social factors.

2.1.1. Pedagogical Process Factors

Research by Scheerens (2000) and Verspoor (2003) suggest that in developing countries the influence of the school on pupil learning is more important than the effect of home and other external factors compared with developed countries. Changing pedagogic practices suggest the need for powerful school-based specialized development programmes as many teachers are unprepared or underprepared to teach and thus developmentally handicapped at the pre-service phase. Intervening at the school level and classroom level is seen as being crucial in raising the quality of primary education in Africa as ultimately educational quality is obtained through pedagogical processes in the classroom. This is achieved through the knowledge, skills, dispositions and commitments of the teachers in whose care pupils are entrusted (Craig, Kraft, & Plessels, 1998; Anderson, 2002; Verspoor, 2003). Therefore, managing the quality of classroom interaction is seen as the single most important factor in improving the quality of teaching and learning, particularly in contexts where learning resources and teacher training are limited.

For example, evidence from Botswana (Arthur *et al.*, 1996), Kenya (Pontefract & Hardman, 2005), Tanzania (Osaki and Agu, 2002); South Africa (Chick, 1996) and Nigeria (Onocha and Okpala, 1990), shows that teacher-pupil interaction often takes the form of lengthy recitations made up of teacher explanation and questions, mostly teacher driven pedagogy, which places pupils in a passive role and limits their learning to memorising facts and reciting them back to a teacher, and this appears to have had little impact on classroom practice (Anderson, 2002; O'Sullivan, 2004). This can be demotivating to pupils as the routine do not promote creativity and can add to low survival rate. Birdsall, Levine & Ibrahim (2005) question the quality of schooling systems in low-performing countries, where the institutional and management challenges are 'significant'. They describe institutions with high

teacher absenteeism; spending and investment which is unresponsive to local needs and preferences; a lack of accountability and incentives for performance. Hunt (2007) also describe the lack of accountability and monitoring mechanisms in some schools. Ghuman and Lloyd (2007) note how teachers once hired are difficult to fire, meaning performance and attendance are difficult to guarantee; and Hunt (2007) centers on a lack of monitoring of policy in practice. Such vices and poor service delivery at schools, such as teachers not being able to finish the syllabus, poor work culture where less attention is paid to academic development of pupils and low pupil teacher ratio where only a few pupils receive attention for their school work result in less morale of pupils towards academics. This can be a critical contributor to low survival rate as this hinders the pupils learning phase.

In terms of human resources, research indicates that female teachers often have an important impact on schooling quality for female pupils (Colclough & Lewin, 2000). However, the availability of female teachers in some countries is low, and particularly in the higher grades of schooling. For example, in Colclough & Lewin, (2000) research, some of the rural schools visited in Guinea and Ethiopia had no female teachers; this is not uncommon. Schools without, or with few, female teachers are often less attractive to parents/guardians on the grounds of security of female students and provides fewer role models to motivate female pupils towards continued attendance.

School facilities, availability of resources, such as textbooks, desks, blackboards have been noted to influence survival rate (Brock & Cammish, 2000). The availability of (separate) sanitary facilities is important for female preservation, particularly as girls get older and start menstruation (Lafraniere, 2005). In research by Colclough, only 5 of the 11 schools visited in Ethiopia had latrines, and, of these, only one was separated for boys and girls. This affect the education attainment for the pupils and has been attributed to contribute to low survival rate observed in the primary level of education. As these are basic requirement in the school setup.

2.2.1. School-Environment Factors

Despite embracing free primary education as early as 2002, most of the countries have not achieved a hundred percent primary school child survival rate to the last grade. An example of the effect of policy changes on the completion rate is provided by Zambia's recent experience. In February 2002, the Ministry of Education announced free primary education which was re-enforced in 2019. In addition, it began the process of expanding access to education in grades 8 and above. However, there were still factors that negatively affected the learning of the pupils in public primary school which can be attributed to the school environment. A study by Manzo (2006) revealed that the introduction of free primary education in some Sub-Sahara African countries led to an increase in enrolment such that classrooms in government primary schools were filled beyond normal capacity. Additionally, (Duncan et al, 2003) contend that, due to this rise in enrolment, the grants could not purchase critical resources needed for effective teaching and learning. Moreover, the grants were often and are still not released on time and are inadequate. As was further noted in another study, for many schools, the grants were still not sufficient enough to meet the

overwhelming needs and several schools reacted by raising PTA fees at the upper basic school level (Grades 8 and 9). Moreover, IOB (2008) asserts that, "the pupil teacher ratio increased from 49:1 between 2002 and 2003 to 57:1 in 2005" In some cases, there was congestion in classrooms with an average number of 77 pupils per class. The pupil book ratio rose to 18:1 and six pupils could share a desk and in extreme cases eleven children could use one desk (Chengo *et al.*, 2005). Additionally, grants could not meet costs for utility services like water, electricity and security. To make matters worse, many schools were not decided on what type of fundraising ventures to embark on to raise additional funds. The pupil performance in numeracy and literacy was and is still poor with only 33% pass rate due to overcrowding. Such an education environment is attributed to low survival rate as some pupils will abscond classes due to their reasoning that they will not find enough desk to seat on at school and the hash classroom environment would bleed conflict as each pupil would seek attention which the teacher is sufficiently unable to provide.

Clean environment leads to a sound mind, with budgetary constraints and inadequate infrastructures such as toilets and clean water in universal primary schools; one wonders whether with limited budget, schools can have adequate facilities to make conducive learning environment for the pupils (Galimak, 2008). In similar studies in Uganda, in 2000, only 8% of all universal primary schools had sufficient latrines for the pupils, and only one third of these schools had separate latrines for girls. This implies that 92% of all schools suffered from lack of latrines and two thirds had no separate toilets for boys and girls. This has a negative effect on the children's survival in schools as many of them drop out of schools due to sanitation related sickness (Galimak, 2008). A study by World Bank (2006) stipulates that some of the contributing factors to the poor performance and absenteeism at primary level were: delayed disbursement of funds, inadequate teaching and learning materials and desks, reduced pupil teacher contact time, inadequate funding for bursary support to meet ever increasing demand due to increase in the number of orphans and vulnerable children and continued existence of classroom congestion due to limited infrastructure and this has continued to compromise the quality of education, leading to poor quality being seen as a major challenge. According to Orlosky (1984), adequacy of finance and its effective management determines the way the school is managed and whether or not the school will meet its objectives. If finances from the government are not adequate, then the schools are not able to procure all the necessary goods and services needed to meet their objectives (Mobela, 2016) for a conducive learning environment.

The government through education policies has been trying to address the challenge by providing school facilities, improving school infrastructures, supplying test and reference books and allocation of teacher. Despite this effort of the government actually what teachers do in their schools and classrooms depends on how teachers perceive and respond to their working environment. In a research conducted by Galimak (2008), it was noted that education's curriculum content and teaching method should be relevant and responsive to different circumstances and needs of children. Teaching techniques, learning methods and materials need to be child centered and appropriate for children. In addition, teacher's capacity, morale, commitment, status, income and recognition to child right should be ensured (Theis,

2004). With regard to most schools, this has been more of a myth than a reality because schools are associated with threats such as, hunger, corporal punishments, violence and insecurity of which they are more pronounced in war areas, as a result, there is low survival rate as children dropout of school since their security is not guaranteed (Tomasevski, 1999).

2.1.1. Socio-economic Factors

Social factors which have contributed to this include household income as schooling potentially incurs a range of costs, both upfront and hidden. Household income is linked to a range of factors: when children start school, how often they attend, whether they must temporarily withdraw and when and if they will stop schooling (Croft, 2002). Porteus *et al.*, (2000), whilst describing exclusions rather than whether the child will survive as per se, paint poverty as ‘the most common primary and contributory reason for students to be out of school’ and Hunter and May (2003) call poverty, ‘a plausible explanation of school disruption’. For example, Brown and Park’s research in rural China (2002) saw ‘poor and credit constrained children’ three times more likely than other children not to complete primary school. If income levels are low, children may be called on to supplement the household’s income, either through wage-earning employment themselves or taking on additional tasks to free up other household members for work. This is more apparent as children get older and the opportunity cost of their time increases. In Boyle *et al.*, (2002) research in some areas of Uganda and Zambia, the inability to pay school fees meant children withdrawing from school for periods of time, however temporarily. Also the fact that universal primary education removed only school fees and PTA charges and left intact other costs such as: exercise books, pens, pencils, uniforms, clothing, lunch, building funds and labour for classroom construction to be met by the parents (MFPED, 2002), it may explain the low levels of accessibility and survival rate in primary schools.

However, what is not assured is whether most children will be able to attend school uninterrupted – not merely because of ill health but also because they may need to work, and the existing school does not motivate them or their parents to attend/send them to school. Attendance is erratic and chronic absenteeism often the norm – especially for older boys and girls. In other instances, both boys and girls also work before and after school, engaging in a wide range of chores – domestic work, sibling care, and filling water (Vimala, 2008).

Community participation is one of the more misused and misunderstood words in the development literature. Therefore, at the outset, it is important to define community participation in the specific context of primary education – referring to those parents whose children are enrolled in government schools or those who are participating from the margins (Vimala, 2008). In the specific context of government school’s community participation should ideally involve people who have little or no access to basic education but have a greater stake in the school. However, these are the very people who are the most difficult to reach out to. The poorest are caught up in the daily battle for survival. From their perspective, education that does not lead to any tangible or intangible gain can be dismissed as being irrelevant. If children are found in a community that views education with such lenses, there survival at primary level is compromised as they lack motivation

or pushing parents or community member to ensure they stay in school.

Child labor create pressure on a child’s time, for example, children who combine work with school, depending on the nature and volume of work, can have erratic school attendance, regular school absences (Croft, 2002) or increased instances of lateness. Children living in slum areas or without permanent residence may move frequently, often leaving school as a result (Chitnis & Suvan, 2004). A full-time work schedule paired with primary education for a ten-year old pupil cannot be sustainable, nor can it be adequate preparation for successful passage of examinations and transition to secondary school. The burden of labour placed on pupils must be defrayed to enable pupils to pursue an unhindered course of primary education.

The community is aware of the need for educating their children yet the children are burdened with work before and after school, during holidays and vacations – both household/domestic and sibling care related chores as well as work outside the home or in homebased occupations. This obviously directly impacts on the learning abilities of children – especially when they put in long hours every day. Most children in poor households do not get time to revise / read their books – especially girls who are higher up in the birth order. Given the nutritional status of poorest children, energy levels are low and impact upon children’s ability to concentrate in school. The impact of working and yet attending school needs to be examined with reference to its impact on learning outcomes.

Whilst being *orphaned* is often linked to an increased likelihood of childhood poverty, this is dependent on the household context and who then becomes the child’s care. Orphan hood often exacerbates financial constraints for poorer households and increases the demands for child labor, (Bennell *et al.*, 2005) and less opportunity to continue with education demands.

Research also indicates that school-aged children who suffer from *protein-energy malnutrition*, hunger, or who lack certain micronutrients in their diet do not have the same potential for learning as healthy and well-nourished children (Pridmore, 2007). Studies suggest that these children attend school less frequently, are more likely to repeat grades, drop out early and fail to learn adequately due to poor levels of attention, low motivation and poor cognitive function (*ibid*). Hence the problem of low survival rate needs to be addressed so that the policy makers can find ways of combating the issue for both proper use of invested resources in education and for social development.

2.1. Theoretical Underpinnings

Low retention rate is viewed generally as the possibility of a newly entrant pupil in grade one to survive primary school-age especially up to grade 5. The factors which lead to the survival are associated with the school life that a pupil goes through especially that he or she is at a dependant level and the decisions are being made on their life. If the people responsible for the child’s education are unable to identify factors that affect the pupil’s academic up bring, there can be a misunderstanding as to why the child switches from being interested in education or the poor performance as a result. Theoretically, the child’s cognitive development is at its tender stage and the decisions that he or she makes will depend heavily on the current situations being encountered. The study is anchored upon the human capital theory, which stresses according to a study conducted by Mabela

Carlos, on impact of free primary education, and holds that the well-being of a society is a function not only of the traditional stocks of financial capital, labour and natural resources but also of the knowledge and skills of individuals (Mobela, 2016). This theory predicts that increased knowledge and skill will yield improved economic outcomes for both individuals and societies, especially in modern societies, where it is widely held that knowledge and skill convey a greater economic and social premium than in the past. It is from this theory that if low survival rate in primary school pupils is prevalent, this will impact the education sector negatively and the resources invested will not yield the expected outcome just as is in a company, the capital invested in the production is expected to yield returns. This theory was also used by authors such as Adams Smith (1776) and Alfred Marshall (1890), who concluded that ‘a man educated at the expense of much labour and time may be compared to one of those expensive machines and the work he learns to perform should repay him the whole expense of his education, and also the time and money spent on education builds human capital hence one should be able to estimate the rate of return on such investment, in a way similar to investment in physical capital (Mincer et al 1958). By tackling these factors, the pupils at a primary level will be able to crossover to secondary level and their invested resources benefiting both the child and the nation at large. Economic analysis has consistently shown that investment in education brings higher rate of return than investment in physical capital (Woube, 2003). Changes in the education arrangement of any country must give due attention to the efficiency and effectiveness of primary education. “The progression of pupils from admission” in the beginning year of their study “until their successful completion” of the cycle of education (primary or secondary) reflects the degree of efficiency in that level of education (UNESCO, 1983). It is therefore important to note that education is the driving force behind any strong economy and a prerequisite

for social and economic growth. It creates opportunities and provides societies with a better educated and skilled workforce which is necessary for stimulating development (Govender and Steven, 2004). Hence there should be high completion level at primary level so that every citizen gains a chance to basic literacy such as writing, reading and arithmetic’s for a better society

2.5 Conceptual Framework

Accordingly, conceptual framework is a set of broad ideas and principles taken from the relevant field of enquiry and used to structure a subsequent presentation (Kombo and Tromp 2006). In the ideal situation, all students admitted in the beginning grade of the education level will reach the second grades in the following academic year and continue until they complete that level of education. But in reality “an alarming phenomenon in education”, wastage (drop-out and repetition) obstructs this “ideal scheme” (UNESCO, 1983). If all the pupils enrolled at entrant would complete primary level, it would bring about productivity and economic wellbeing of the citizens. However, this ideal situation is unattainable especially in most developing countries, Zambia inclusive, because of the resource constraint that most face. This study conceptualises the prevalent factors as being lack of finances to build enough educational infrastructure that are basic needs, lack of proper curriculum developments that ensures efficiency and effective learning structure and social economic factors that young learners go through. In a nutshell, this study centres mainly on the low survival rate and the factors that lead to this which are basically classified as pedagogical processes, school environmental factors as well as social factors. These factors when studied will be able to demonstrate that the pupils’ inability to complete primary level can be attributed to such factors and that there is also a relationship among these factors (variables) and the low survival rate of public primary school pupils

Independent Variables *Dependent Variable*

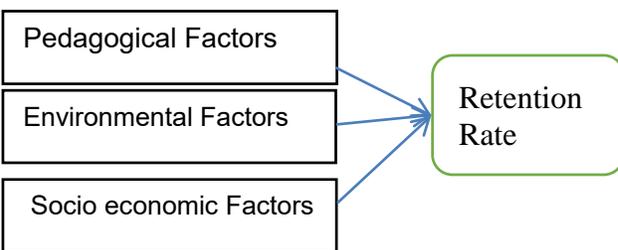


Figure 1: Conceptual Framework
Source: Author’s Construction (2020)

III. METHODOLOGY

A survey method was employed incorporating a qualitative research paradigm. The qualitative study design was used as it is more holistic and often involves a rich collection of data from various sources to gain a deeper understanding of individual participants, including their opinions, perspectives, and attitudes. Qualitative research gathers data qualitatively, and the means of analysis is also primarily qualitative. This often involves an inductive examination of the data to find recurring themes,

patterns, or ideas (Shank, 2006) and then describing and interpreting those categories. The study targeted 66 public primary schools in Lusaka district as at 2020 out of which 10 were randomly selected. The questionnaires were distributed to 10 selected public primary schools in Lusaka. The study sampled a total of 100 respondents who were to be given self-administered questionnaires with the researcher carrying out the activity on-the-spot-basis. The respondents comprised head teachers, deputies, senior teachers, school counsellors, teachers and school administrators. Questionnaire responses were subjected to

analysis using excel and SPSS to gain in-depth understanding of the phenomena with the results being presented in charts, figures, tables and graphs while minor content responses were presented in text format. The researcher equally maintained mandatory ethical norms by implementing informed consent, anonymity, confidentiality, and citation of all materials with references being listed at the end of the study.

IV. ANALYSIS OF FINDINGS

2.3. Pedagogical Factors

Teachers have a huge responsibility of both imparting knowledge as well as building the children entrusted to them. This is achieved through the knowledge, skills, dispositions and commitments of the teachers in whose care pupils are entrusted (Verspoor, 2003). From the data collected and analysed, it shows that there are some teaching approaches which contribute to low retention rate among primary school pupils. Some teaching methods such as those which expose the pupils' illiterate levels can discourage some pupils to attend school hence the need for teachers to be sensitive, diligent and wise in dealing with pupils' vulnerability. The other factors which came out strongly as prohibitive to pupils' retention were teachers' qualifications, teacher's level of lesson preparedness, and teacher's attitude / commitment to his/her professional calling. On these factors, respondents scored generally above average in agreement of the resounding impact the factors have on pupils' endurance especially in lower levels. By implication, teachers were supposed to apply with wisdom the skills garnered from their training in sociology, psychology, philosophy, teaching methods / approaches, principles of teaching etc to create a conducive learning environment user-friendly to all learners. This is a more reason why the training of teachers need particular attention to ensure alignment to pupils' learning needs but more so the design/framing of the school curriculum. It is quite clear that the Zambian curriculum framework is not tailor-made to a large extent as all learners are required to take up even subjects which are way off from their references and experiences to their detriment. There is also still seemingly a mismatch between the curricular of education training institutions and learner curriculum, which also bring a dynamic set up in the whole learning process of the child at the level in question as both the pupil and the teacher are seemingly at trial and error with a victim ultimately being a learner.

Research by Scheerens (2000) and Verspoor (2003) suggests that in developing countries the influence of the school on pupil learning is more important than the effect of home and other external factors compared with developed countries. Changing pedagogic practices suggests the need for powerful school-based specialized development programmes as many teachers are *unprepared or underprepared* to teach and thus developmentally handicapped at the pre-service phase. In the QSQS Report (2015) by World Bank in Zambia, it came to light that a number of teachers were not qualified to teach their respective classes. About 22% of grade 5 school teachers have GCE or lower degree qualifications. More importantly, the process of recruiting teachers in public schools is less stringent since it does not involve any interviews unlike is the case with other public service employees. Thus, even less competent teachers ultimately end up

being employed due to poor selection processes that are prone to corruption and nepotism (Hapompwe, Karim, Kambikambi & Milimo, 2020a).

2.1. Environmental Factors

The school environment encompasses classroom arrangement, classroom population, school's outside arrangement and physical appearance, water and sanitation, furniture, facilities like computers, digital projector / television sets to excite / ease learning, text books, internet and any other necessary infrastructure. From the data collected, the respondents were able to relate the low retention rate to an uncondusive school environment. Clean school environment leads to a sound mind but with budgetary constraints and inadequate infrastructure such as toilets and clean water in universal primary schools, one wonders how schools can have adequate facilities to create conducive learning environment for the pupils (Galimak, 2008). The results showed that 53.1% agreed that a school environment plays a significant role in learner retention rate while 8.2% strongly agreed to this. On the other hand, 21.4% of the respondents disagreed with 2.0% strongly disagreeing while the other 6.1% of the respondents were neutral about about the phenomena.

In buttressing the foregoing, it should be stated that school environment is of utmost importance in determining the continuity of a new entrant pupil. It has to do with various input factors which aid and motivate the learner to keep in school. According to Hapompwe, Karim, Kambikambi & Milimo, (2020a), some notable factors responsible for the low learner performance have been identified as inadequate trained teachers especially in Science and Mathematics; inadequate teaching and learning materials for the new curriculum; low teacher motivation and absenteeism; high pupil teacher ratios; ineffective school management and supervision; poor administration of the transfer policy for teachers; and inadequate funding at school level.

Empirically, according to the 2015 Educational Statistical Bulletin, the pupil/book ratios for both English and Mathematics was at **4:1** in 2015. While the book ratios for Zambian Languages and Life Skills was **5:1** and **7:1** respectively. The figures show that there is little or in some cases, no difference at all in the pupil-to-textbook ratios between urban and rural based primary schools. Latest statistics indicate that five primary school students share less than *1 textbook* for each subject (1 for Mathematics, 0.9 for English, and 0.9 for Science) (World Bank, QSQS, 2015). Additionally, the 2015 figures from the Educational Statistical Bulletin further demonstrate that learners in Grades 1-4 spend 3.9 hours in the classroom, while learners in Grades 5-7 spend 5.3 hours per day which are way too low. Schooling hours per student are much more affected by the school's location—urban or rural. Worse still, this contact time is based on the scheduled learning hours on the official school calendar and therefore does not include time lost as a result of premature school closures, learner or teacher absenteeism, examination period closures or time allocated to sporting activities (ESB, 2015; World Bank, 2015).

2.2. Socio Economic Factors

Socio economic factors have been known to be among the major contributors to the pupils' low retention rate in most public primary schools. Among these factors include but not limited to; family economic background, whether a pupil is orphaned or not, family size, educational background of the parents/guardians and also the community values and norms. In the current study,

respondents indicated that some pupils were unable to complete primary school level because the parents failed to meet the school requirements such as uniforms, user fees, buying school books and other needs. Household income is linked to a range of factors: when children start school, how often they attend, whether they must temporarily withdraw and when and if they will stop schooling (Croft, 2002). The data collected from various schools showed 32.7% agreed and 14.3% agreed and strongly agreed respectively that some children withdraw from school because their families were unable to meet the school requirements / needs while 32.7% disagreed with the 11.2% being neutral about this variable. Additionally, child labour became another prominent factor linked to poverty as causal to low retention rate. Children who are given so many responsibilities at home are likely not to perform better at school. Some of the responsibilities such as house chores, looking after the young siblings and the old people have been a contributor to low retention rate. The opportunity that the children have to go to school is channeled to help at home hence denying them the chance of attending classes. This eventually discourages the child from taking their education seriously. From the obtained data, 60.2% of the respondents agreed that home responsibilities were among the causes of low retention rate of the pupils in public primary schools and 20.4% of the respondents strongly agreed. On the other hand, only 2.0% of the respondents disagreed and 11.2% of the respondents were neutral about this. Child labor creates pressure on a child's time. For example, children who combine work with school, depending on the nature and volume of work, can have erratic school attendance, regular school absences (Croft *et al.*, 2002).

Other social factors such as poor nutrition that the child faces contribute to low retention rate. The pupils who do not obtain a proper diet or lack food at home find it hard to go to school which leads to missing classes regularly, and if they go, they are unable to concentrate. The data obtained from the various public primary schools showed that the majority, that is 25% strongly agreed and 21% agreed that a poor nutrition is also a contributor to low retention rate. However, 26% of the respondents disagreed that food has a role to play in pupils' low survival rate.

Corroborating with the study's findings, according to UNICEF, out of the 500,000 children who were out of school in 2014, the majority were from poor families. Rural children are again much more likely to be out-of-school with almost a quarter (23 per cent) of primary age children not in school compared to only 9 per cent in urban areas. Differences are even more marked among socio-economic groups with out of school rates of 26.9 per cent among primary school age children from the poorest families compared to only 4.3 per cent among children from the richest families. Children in Eastern, Luapula, and Western provinces are particularly disadvantaged, especially the girls in Luapula and the boys in Western with out-of-school levels of 28.7 per cent and 31.4 per cent respectively. The national average for the entire age group is 18.3 per cent but this masks the fact that nearly a half of all 7 year olds and a quarter of all 8 year olds are out-of-school, suggesting a large and widespread problem with late entry (UNICEF, 2014).

It should be stated that the poverty levels in Zambia are so high that they affect children's ability to continue with school owing to hunger, malnutrition, lack of school fees i.e. user fees etc. In 2010, the moderate poverty rate in rural areas was 74 percent, more than

double the urban poverty rate of 35 percent. Because roughly two-thirds of the population lives in rural areas, the countryside is home to 80 percent of Zambia's poor. Rural poverty is also far more severe: almost 90 percent of Zambians living below the extreme poverty line are concentrated in rural areas. This is largely an effect of uneven income growth in the urban and rural economies. Rising incomes have been densely concentrated among a relatively small segment of the urban workforce, while high urban unemployment rates effectively block the rural labor force from participating in the country's more dynamic economic sectors (World Bank, 2012). In absolute terms, 5.1 million Zambians were living in extreme poverty, with 7.9 million in moderate poverty in 2010, indicating still a significant size of population under poverty. Among other factors prohibiting effective progression of children with school include child labor, state of being parented, segregation of roles between boys and girls etc. (UNICEF, 2014). The lop-sided aspect of it all is the fact that even siblings of these children who could be of help in their education are trapped in unemployment cycle. According to the World Bank Report (2015) in Zambia, the youth, aged between 15 and 24, account for more than 40 percent of the total population, representing a youth bulge, which may be translated into a demographic dividend if complemented by economic and social opportunities for the youth. While the youth constitute 30 percent of the total labor force, their unemployment rate is more than 15 percent, which is almost twice as high as the average unemployment rate of 7.9 percent. This means that of the unemployed population of 459,132, almost 60 percent are the youth aged between 15 and 24 (Zambia Central Statistical Office, 2013). One of the reasons for the high level of youth unemployment is that the youth tend to lack the skills, competences and attributes required by the labor market (Koyi, Masumbu, & Halwampa, 2012).

Notwithstanding the foregoing vicious poverty circle description of the Zambian scenario, it should be chronicled that the Government of the Republic of Zambia through the Ministry of General Education with co-operating partners has had measures to ameliorate or demystify the impact of poverty on learners' academic progression especially at primary school level. Among the prominent measures were the declaration of free primary education meant to remove the barrier of accessibility and affordability. Besides, government initiated feeding programmes and social welfare sponsorship packages for orphans and vulnerable children across the country. However, empirical evidence in Hapompwe & Kambikambi (2020b) study in Lusaka indicates that government's education financing to the education sector has been on a steady downward declension from 2015's 20.2% to 2019's 12.2% of national budget against UNESCO's 20% threshold, ostensibly implying inadequacy in resources to meet the above education necessities for smooth operationalization of the sector and subsector in particular. The study further unearthed government's inadequacies and inconsistencies in grant disbursement to schools thereby leaving no financial resources to sustain the operation of public primary schools which solely depend on government financing for all termly expenditure. In the other study by Hapompwe, Karim & Kambikambi (2020c) which analyzed threats to the sustainability of Free Primary Education, it was established that withdrawal of donors' education financing, population upswing against static

education expansion, economic recession and financial mismanagement were frantic factors to poor quality education currently prevalent in the sector and subsector alike.

V. CONCLUSION

The equitable supply of trained teachers along with physical input factors in public primary schools is of paramount importance to maintaining a higher retention rate among pupils. This should be augmented by an enhanced and improved parents' economy through government's deliberate efforts to ensure a conducive and supportive socio economic environment for children's quality education sustainability. Without a cautious policy intervention which should include revitalised education financing to the threshold, inclusive education quality will remain a pipeline dream

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Chemical, mechanical, thermal analysis of a nano ceramic embedded novel composite material for automotive and industrial applications

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Abstract- Study describes the processing of nano ceramic/polyester composite using a polyester matrix with different mixing ratios of nano-hydroxyapatite ceramic as the reinforcement and the filler. Processed products were analyzed to find out; physical, chemical, mechanical, thermal properties including reinforcement particle size distribution, composition, presence of functional groups, crystallography, surface morphology, structural features, thermal stability, a variation of glass transition temperatures and tensile properties. Results have shown high thermal stability, material stability with good mechanical properties in the processed nano-products. The study concluded, after incorporating polyester with nano-ceramic lead to have products with higher properties for automotive and industrial applications.

Index Terms- Hydroxyapatite, Solid state sintering, Polymer matrix composites, Automotive applications

I. INTRODUCTION

Composites consist of two or more constituents that are not soluble in each other, in terms; those constituent materials are combined on a macroscopic scale to form a useful third material. The harder reinforcing phase available in the form of particles, flakes, woven mats, fibers or whiskers etc. imbedded in the matrix phase which may ductile and continuous. [1]

Specially, researchers have shown those lightweight composite materials offer a great potential for increasing efficiency of vehicles while requiring less energy, boosting the fuel economy, maintaining safety and reducing the exhaust emission with improved ride performance including reduction of noise, vibration, harshness etc. [14-18]

Considering that, we have processed a nano ceramic composite with polyester as the matrix material and a nano ceramic powder which inhouse synthesized material as the reinforcement. Used nano hydroxyapatite ceramic filler was solid state synthesized value-added product of Chloroapatite mineral that has several industrial applications due to its range of properties. [19-28] 101 Polyester (PA) was chosen as the light weight, low cost polyester matrix. It is a medium thixotropic, pre-accelerated, unsaturated, orthophthalic polyester resin with high wear resistance which is particularly suitable for molding casting and laminating in the

manufacturing industries of boats, water tanks, bathtubs, portable, flower pots, chairs, trays etc. [29]

This study is fully aimed to process and analysis novel nano ceramic polyester composite which can be used for industrial applications including automotive structural applications for car bumpers, brakes, clutch plates etc.

II. MATERIAL AND METHODS

A. Composite preparation

Table 1. Masses of ceramic filler and polyester resin mixtures for composite samples

Sample Name	Composition (Wt%)	
	Polyester mixture	Nano-hydroxyapatite ceramic
NP material (control)	100	0
SSHAp 5% composite	95	5
SSHAp 10% composite	90	10
SSHAp 15% composite	85	15
SSHAp 20% composite	80	20
SSHAp 25% composite	75	25
SSHAp 30% composite	70	30
SSHAp 35% composite	65	35
SSHAp 40% composite	60	40
SSHAp 45% composite	55	45
SSHAp 50% composite	50	50
SSHAp 55% composite	45	55
SSHAp 60% composite	40	60
SSHAp 65% composite	35	65
SSHAp 70% composite	30	70
SSHAp 75% composite	25	75
SSHAp 80% composite	20	80
SSHAp 85% composite	15	85
SSHAp 90% composite	10	90
SSHAp 95% composite	5	95

First solid-state synthesized ceramic was ball milled using a planetary ball mill (TENCAN, XQM-0.4A) over 24 hrs to obtain

more fine particles. Resulted nano-hydroxyapatite powder was taken as the ceramic filler material. [19,20]

Next masses of the filler and polyester resin mixture were mixed according Table 1 below to process the series of nano-ceramic incorporated polyester composite samples.

The masses of the 101PA, unsaturated polyester resin was calculated according to the required volume of cast, the Cobalt naphthalate accelerator and the MEKP, hardener was added as weight % with an amount of 0.05% and 1 % respectively.

Using an overhead stirrer, nearly for 150 rpm stirring rate, weighed amounts of polyester resin, hardener, filler and the catalyst were mixed together thoroughly for nearly 30 minutes at the room temperature continuously and slowly to avoid bubbling during mixing. After that, the mixture was uniformly poured from one corner into the molds until the required level of filling (to avoid bubbles formation which may led to cast damage).

Then the mixture was left in the mold for 24 hrs at room temperature to solidify. Finally, after placing them inside a dryer oven for 48 hrs at (60-75) °C to reveal complete polymerization, best coherency, and to relieve residual stresses; samples were taken out from the molds to do further analysis.

B. Composite analysis

Solid state sintered ball milled hydroxyapatite powder was analyzed under Malvern nano- particle analyzer (MAL1184267) to find out its particle size distribution. Then the NP material, crosslinked pure polyester matrix material without reinforcement was taken as “control” and series of ceramic filler added polyester matrix composites were analyzed with Fourier transform infra-red spectroscopy (Bruker – Alpha [FTIR] spectroscopy) over the region 400–4000 cm^{-1} using KBr pellet technique with the resolution of 4 cm^{-1} to obtain composition, mainly the presence of functional groups. Scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM with EDS) (Hitachi SU6600 with AZtec software) was carried out to examine elementary composition, presence of impurities and surface morphology micro/nano structural features of all processed composites. Also, the sample mixtures of all new nano-hydroxyapatite ceramic polyester composites were studied using X-ray diffractometer (Rigaku – Ultima. IV diffractometer) in reflection mode with $\text{CuK}\alpha 1$: 0.154 nm radiation, scanned speed of 1.5° min^{-1} within 15°–80° ranged angles as 2θ values to determine their crystallographic phases. Differential scanning calorimetry was done for the processed composites using DSC PT1000 (DSC_A_7016_17_0) instrument with N environment, 100 °C min^{-1} heating rate up to 650 °C maximum temperature to find out their variation of glass transition temperatures (T_g values). After that, Thermo gravimetric analysis (TGA) was done only for contro, SSHAp 15% and SSHAp 50% composite samples using a thermal analyzer (SDT Q600) with N environment, 20 °C min^{-1} heating rate and 1450 °C maximum temperature to find out the thermal stability of composite with the addition of filler. At last, Tensile test was performed at room temperature using Tensile Strength Tester (Testometric M500-50CT) for all composite samples including control to find out best mixing ratio of filler and the polyester matrix having highest

tensile properties. For that, ASTM E 8/E 8M - 08 standard sample specimens were used.

III. RESULTS AND DISCUSSION

A. Nano particle Analysis

Particle analysis was performed for hydroxyapatite ceramic filler samples to find out its distribution of size. Results have shown diameter of filler particle, distributed around average value of 419.7 nm with a standard deviation of 56.85 nm. It has proven that the filler particles in nano meter range which tend to be in spherical shape.

B. EDS Analysis

Table 2. Comparison of EDS results between NP material, SSHAp 15% and SSHAp 50% composites

Element %	NP material		SSHAp 15% composite		SSHAp 50% composite	
	Avg	SD	Avg	SD	Avg	SD
C	76.9	0.91	65.4	0.31	66.7	0.42
O	22.8	1.01	33.7	0.65	32.4	0.73
Ca	-	-	0.6	0.25	0.6	0.22
P	-	-	0.2	0.13	0.2	0.12
Si	0.3	0.12	0.1	0	0.1	0

Avg - Average value SD - Standard Deviation

As indicated in Table 2 it can be clearly stated that NP material is only comprised of normal polyester resin, hardener and accelerator consists of C, O and Si elements. Comparing it’s result with SSHAp 15% and SSHAp 50% polyester composites results show that; after the addition of nano-hydroxyapatite as the ceramic filler, Ca and P elements have added to the polyester composites. Also, Avg and the SD values describe that the repetition of values is more consistent.

C. FTIR analysis

According to the Figure 1; all ceramic added polyester composites consists of 560 cm^{-1} , 640 cm^{-1} , 963 cm^{-1} , 1028 cm^{-1} , 1110 cm^{-1} and 3572 cm^{-1} peaks related to the hydroxyapatite ceramic. That may occur with the addition of ceramic filler. Further the 560 cm^{-1} , 640 cm^{-1} , 963 cm^{-1} , 1110 cm^{-1} and 1028 cm^{-1} peaks related with the presence of PO_4^{3-} groups and the 3572 cm^{-1} peak exhibits the characteristic OH⁻ peak in the hydroxyapatite.

Also, some peaks nearly 1117 cm^{-1} , 1286 cm^{-1} , 1726 cm^{-1} and 2986 cm^{-1} can be found within NP material as well as in all ceramic filler added polyester composites. Those peaks directly related to the polyester group of the mixture. Normally, 1117 cm^{-1} , 1286 cm^{-1} , 1726 cm^{-1} and 2986 cm^{-1} related with the C-O, C=O and C-H (alkyl) stretches accordingly. [19,20]

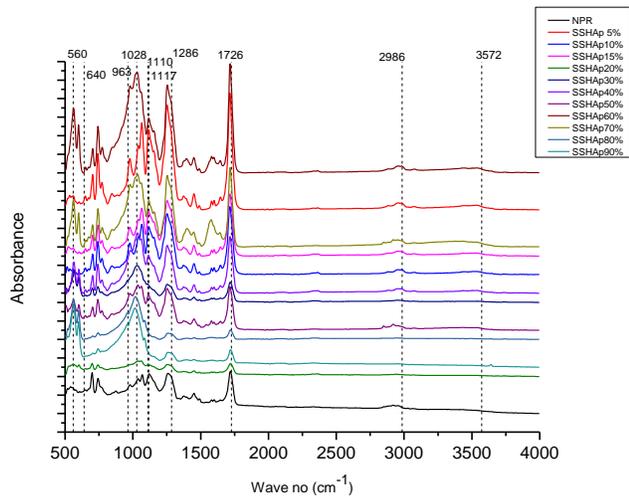


Figure 1. Resulted FTIR curves for processed composites

D. XRD analysis

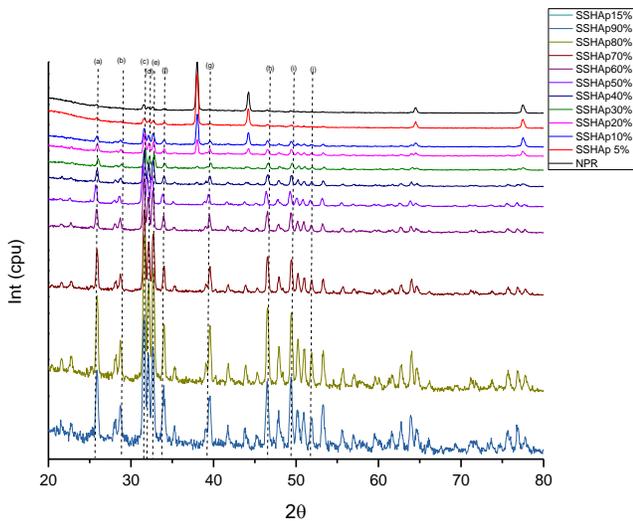


Figure 2. Resulted XRD patterns for processed composites

As mentioned in the Figure 2, when consider (a) - (j) peaks which are mentioned in the resulted XRD patterns for processed ceramic polyester composites apart from NP material related to the 002, 210, 211, 112, 300, 202, 310, 222, 213 and 004 crystallographic phases of hexagonal hydroxyapatite ceramic filler in order. Both peaks which occurred in the processed ceramic polyester composites as well as the NP material may occur due to the polyester. Also considering the XRD pattern it can be concluded that the processed composites contain crystalline properties. [19, 20]

E. DSC analysis and Tensile test

Table 3 & Figure 3 have shown; with the addition of ceramic up to 15%, processed composites' Tg values have increased due to

the increasement of crosslinked density or with the increasement of number of cross links between polyester molecules and internal heat transfer. [30] As that, tensile strength /mechanical and thermal properties of the composites are increased parallelly. With the excess addition of ceramic than 15% Tg value has decreased that may sue to the free volume occupied, agglomerations and the sample degradation etc. The highest average value for tensile strength can be found within SSHAp 15% composite samples. Therefore, it can be concluded 15% ceramic filler added polyester composites is the best mixing ratio.

Table 3. DSC and Tensile analyzed results for all processed composites

Sample Name	Glass transition temperature Tg (°C)	Maximum Tensile Strength σ_{Max} (MPa)	
		Avg value	SD value
NP material (control)	72.5	14.3	0.08
SSHAp 5% composite	74.9	14.1	0.79
SSHAp 10% composite	75.8	13.5	0.83
SSHAp 15% composite	77.9	18.7	1.25
SSHAp 20% composite	76.7	15.6	1.84
SSHAp 30% composite	74.8	12.7	1.15
SSHAp 40% composite	70.0	10.4	0.76
SSHAp 50% composite	71.9	5.9	1.17
SSHAp 60% composite	71.7	9.2	1.23
SSHAp 70% composite	68.9	3.8	0.98

Avg -Average value SD-Standard Deviation
*** 80%, 85%, 90% and 95% ceramic filler added polyester composites are too much brittle. Therefore, there DSC and Tensile results have not included in the table.

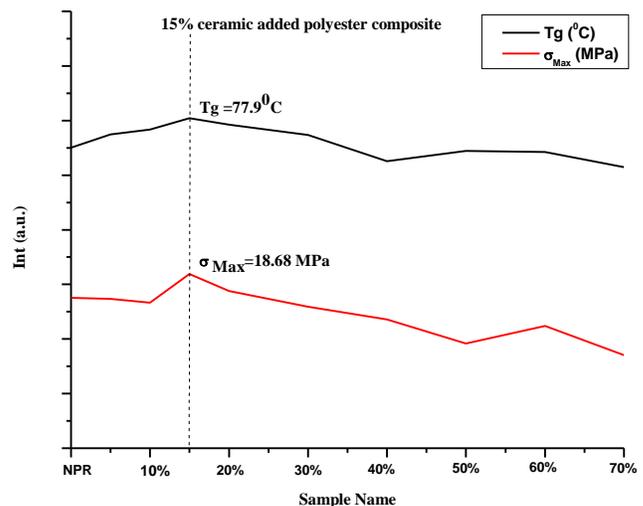


Figure 3. Comparison of Tg and σ_{Max} values of processed composites

F. TGA analysis

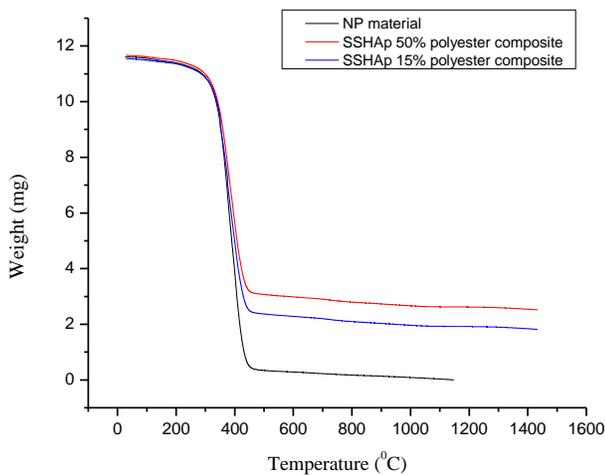


Figure 4. Comparison of TGA results between NP material, SSHAp 15% and SSHAp 50% composites

Similar pattern of weight loss can be found within all three curves in the Figure 4. With the addition of hydroxyapatite ceramic filler, composites overall weight loss has decreased than the control, which may occur due to higher heat absorbance of hydroxyapatite ceramic than the polyester. Therefore, it can be concluded that amount of weight loss of control has reduced after incorporating nano hydroxyapatite ceramic as the reinforcement as well as the filler and the ceramic filler added polyester composites perform good thermal stability and good material stability in nature and applications than the pure crosslinked polyester material without reinforcement.

G. SEM analysis

Considering Figure 5-8 SEM images of all processed composites; 100k images have shown that all composites have unique continuous surface in the 500nm range. Those images contain boundaries or cracks that may occur due to the gold coating of samples while analyzing samples under the SEM. When examine the 5k images; they have clearly exhibited that free volume has reduced with the addition of nano ceramic filler within SSHAp 15% and SSHAp 50% samples and with the excess addition of nano ceramic filler, sample lead to have some porous structure which improve the brittleness of structure as shown in SSHAp 90%. Those results coincided with the Tensile & DSC results as well.

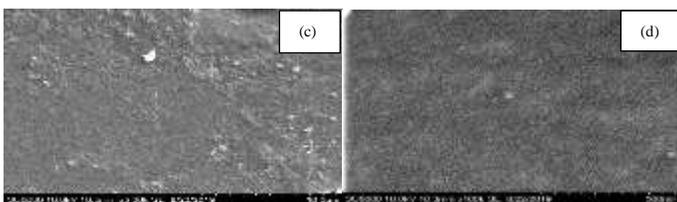


Figure 5. SEM images of NP material; 10kv, (c)5k (d)100k

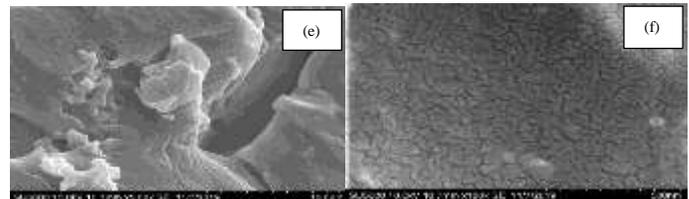


Figure 6. SEM images of SSHAp 15% composite; 10kv, (e)5k (f)100k

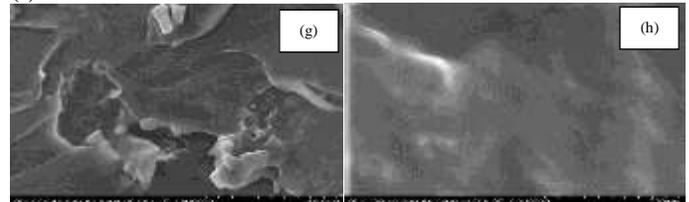


Figure 7. SEM images of SSHAp 50% composite; 10kv, (g)5k (h) 100k

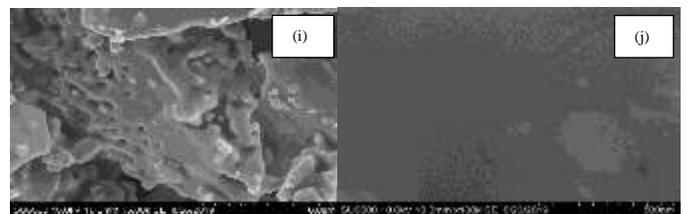


Figure 8. SEM images of SSHAp 90% composite; 10kv, (i)5k (j)100k

IV. CONCLUSION

Finally, the study concludes that processed nano-hydroxyapatite ceramic filler added polyester composites can be used for automotive applications such as car bumpers, brake pads/liners, internal and external structural parts etc. Also, it can be used for other industrial applications such as for structural parts in building constructions, bridge repairing, for sports ware - cricket baseball etc. [31,32] considering its better tensile properties good material stability and thermal stability in nature than the pure polyester crosslinked material without reinforcement.

Hydroxyapatite ceramic has a higher melting point nearly 1670 °C and with that it's ability of absorbing more heat energy lead to process nano-hydroxyapatite incorporated polyester composites with better thermal and material properties than the pure polyester resin. Amongst them SSHAp 15% composite has shown highest Tg value and higher tensile properties. At, 15% Hydroxyapatite nano-composite has increased its crosslink density due to high thermal absorption of nano ceramic with high heat conductivity and higher surface area due to nano particle size; beyond that maximum tensile peak has passed and oxidative degradation starts during fully cured composites.

Resulted nano hydroxyapatite ceramic added polyester composites consisted of unique continuous composite surface and excess addition of ceramic, above 75% increases brittleness. That may occur due to the decrease of free volume, decrease of polyester and ceramic bonding capacity with the addition of ceramic as mentioned in the SEM images. Therefore, excess

addition of ceramic, above 75% more porous, brittle structure can be found within processed ceramic polyester composites.

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Strategic Management and Strategic Leadership

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Abstract- There are numerous explanations and theories in contemporary literature regarding strategic leadership and management. Leadership has a significant impact on the strategic management process and thus facilitates the organization to implement effective strategies. During the strategic management process, leadership performs various roles as strategist, analyst, guide, organizer, motivator, developer, decision maker, collaborator and evaluator. Nowadays, organizations always need good strategic management and a capable leader to be able to achieve their goals. The main purpose of this paper is to examine strategic management and leadership, with a focus on the relationship between them. So discover what role leadership has in formulating and implementing strategy management by reviewing existing literature. We can say that strategic leadership is a process that transforms the organization into a successful organization through the right strategies. It is the responsibility of leadership to motivate and inspire employees in the organization to work together. The article consists of five parts; the first part is a presentation or introduction, the second part presents a summary regarding the definition of strategic management, the third part Leadership and its definitions, while the fourth part explains the relationship between strategic management and leadership and their impact on strategic decisions and in the end, the conclusion.

Index Terms- Strategic Leadership, Strategic Management, Leadership, Management.

I. INTRODUCTION

Today, most organizations face competition due to advanced technology, to stay competitive in this market, an organization must plan well for the future and form a strategy which will determine the future of the organization. A well-defined strategy integrates an organization's core plans, objectives, policies, programs, and commitments. Today's business environment is changing rapidly and mostly leaders strive to adopt flexible process strategies to ensure the organization responds to change. The most important task of leadership is to align its vision with the goals and objectives of the organization so that the organization can compete with the dynamic environment efficiently and training and motivate people to achieve the vision. The vision should be simple so that everyone can easily understand it. A person's mission should be clear and concise and distinguish it from any other company. Management teacher Peter Drucker, the source of many contemporary thoughts about business mission, argues that asking the question "What is our business?" It's like asking the question, "What is our mission?" A business is defined by its mission. Only a clear definition of the organization's mission

makes clear and realistic business objectives possible, because the mission defines the purpose of this company in terms of the sustainability of its reason for being. The mission defines the long-term vision of the organization in terms of what it wants to be and who it wants to serve. (Drucker, 1974, p.96)

1.1. Purpose

This article discusses the relationship between management and strategic leadership and its effect on decision making. This paper is written with the aim of analyzing different definitions of strategic management, definitions of leadership, and discusses the impact of strategic management and leadership on strategic decision making.

1.2. Methodology

This paper reviews the strategic management and strategic leadership literature. Secondary data were used, respectively the literature review examination was done to achieve the desired results. Strategy formulation and implementation have become more important than ever. However, strategy formulation in organizations is the creation of a unique and valuable location that connects a range of variable actions. Meanwhile, strategy execution is the interpretation of choosing a strategy for organizational action to meet strategic goals and objectives.

II. LITERATURE REVIEW

2.1. History and evolution of strategic management

The literature on strategy is now voluminous and the texts of strategic management are growing more and more. The emergence of strategic management can be traced back to the 1950s, when Selznick (1957) introduced the need to bring together the organization's 'internal state' and 'external expectations' for implementing policy in the social structure of the organization. Andrews (1971) defined strategy as the balance of actions and choices between an organization's internal capabilities and external environment.

Researchers and consultants have provided numerous models and frameworks to analyze strategic choice. The word "strategy" is derived from the Greek word "stratēgos"; stratus (meaning army) and "before" (meaning leadership / movement). Strategy is an action that managers take to achieve one or more goals of the organization. (Chapman, 2016) Very few organizations have a clear leadership strategy. A leadership strategy makes clear how many leaders we need, what kind, where, with what skills, and how to behave in that individual and collective way to achieve the overall success we seek.

According to Hamel, winning strategy = foresight + vision.

For the successful implementation of strategies, the challenge of leadership is to be strong but not rude, to be good but not weak, to be humble but not shy, to be proud but not arrogant, to have humor but without foolishness. Strategy can also be explained as choosing one process or several processes to achieve the main long-term goals of the organization. It also includes courses of action and the allocation of resources needed to achieve the desired objectives. (Elkhdr, 2019, p. 59)

A manager must set out four key skills in order to be able to implement effective leadership strategies:

- Brains;
- self-assessment skills;
- supervision and control skills;
- communication skills; (Jaradat & Mashhour, 2017, p.327)

It can be concluded that strategic management consists of three main steps:

1. strategic formulation
2. strategic implementation and
3. strategic control and evaluation (Finkelstein & Hambrick, 1996).

Most organizations no longer see employees as a resource whose primary function is to provide goods and services, but rather are seen as critical to their ability to provide quality services and their ability to grow and evolve continuously. . (Farzad, 2006, p. 12)

2.2. Definition of Strategic Management

Year	Definition	Authors
2004	Strategic management can be interpreted as a set of managerial decisions and actions of an organization that can be used to facilitate competitive advantage and higher long-term performance over other organizations.	Wheelen and Hunger
2011	Strategic management is a leading, comprehensive, ongoing process that helps train and implement effective strategies that ensure agreement between the organization and its environment to achieve strategic objectives.	Lonescu et al.
2008	Strategic Management (Strategic Management) is an ongoing process that involves identifying the strategic goals, vision, mission and objectives of an organization along with an analysis of its current situation, developing appropriate strategies, putting	G. Dess, G. Lumpkin, A. Eisner

	these strategies into action and evaluation, modification or modification.	
2017	Strategic management is defined as the evaluation, planning and implementation process created to maintain or improve competitive advantage.	Bonnici

III. LITERATURE REVIEW

3.1. History and Evolution of Strategic Leadership

The history of leadership theory began with leadership traits, which makes the difference in the functioning and approach of the leader to his followers. This approach prevailed in research until the late 1940s. A review of the literature suggests that leadership was discussed in the Egyptian and Arab city. The study of leadership can be traced back to the ancient Egyptians, Greek philosophers like Plato, Socrates and Aristotle. During the twentieth century, considerable effort has been made by scholars and practitioners to classify different dimensions of leadership. At the end of the twentieth century, efforts were made to look at different models of leadership to integrate into a broader framework called "complete theory of leadership" (Avolio, 1999 & Avolio.et.al., 2009). Today leadership is the most studied and least understood topic, as we assume it is a phenomenon which is complex and mysterious (Almohaimeed, Saleh. 2014).

Carlyle asserted in his "great theory" that leaders are born and that only those men who are endowed with heroic potential can ever become leaders. He thought great men were born, not made. Leadership theory then progressed from the dogma that leaders are born or are destined by nature to be in their role at a given time to reflect certain traits that predict a potential for leadership. But further studies have proven that traits do not always predict leadership effectiveness, and so researchers have shifted to look at the leader's behavior, style, and development and effectiveness. Different leadership styles have an impact on organizational vision, goals, mission, culture, structure and rules, which are also related to the strategic management of the organization (Hill and Jones, 2007).

3.2. Definition of strategic leadership

Most definitions have a common theme of leading a group towards a goal. Leaders play an important role in achieving organizational goals by creating a climate that would influence employee attitudes, motivation, and behavior.

"A leader is one who knows the way, goes the way and shows the way" (John C. Maxwell).

Leadership is defined in terms of traits, behavior, influence, patterns of interaction, role relationships, and holding an administrative position (Yukl, 2002, p.2).

Year	Definition of Leadership	Authors
2010 & 2014	Relationships between an individual and a group based on common interest and they behave according to the leader's instructions	Shastri, Shashi Mishra & Sinha & Keskes

1978, f. 18	Leadership is exercised when individuals mobilize institutional, political, psychological, and other resources in order to inspire, engage, and complement the motivations of followers.	Burns
1998, f. 415	Leadership is the process of influencing others to achieve organizational goals.	Bartol & Martin
1999: f.184	Leadership is the ability of an individual to influence, motivate and allow others to contribute towards the effectiveness and success of the organization.	(House et al.)
2000, f.287	Leadership is a special case of interpersonal influence that makes an individual or group do what the leader or manager wants to become.	Schermerhorn
2007, f.14	Leadership is a dynamic process, where leaders mobilize others to do extraordinary things. To do this, leaders include five practices: model the way, inspire a shared vision, challenge the process, allow others to act, and encourage the heart.	(Kouzes and Posner)
2009	Leadership is a critical element in formulating and implementing strategy. It is a connection that connects the soul of the organization with its body.	(Mathew)
2005 & 2014	Dynamic process, through which one influences the other to contribute voluntarily to the realization and achievement of objectives towards the common goal.	Cole & Chowdhury
2011	Leadership is responsible for directing subordinates to perform organizational tasks effectively	(Azhar & ET AL,
2015	We can say that leadership is the center of the organization and should serve as the blood and brain, so that the fruits of success are secured and shared.	(Azhar & ET AL)

IV. MANAGER VS. LEADER

It has been discussed whether leaders are different from managers or they are the same; Now most of us are tired of the endless efforts to distinguish between the concepts of managers and leaders.

One view argues that the role of management is to promote stability or enable the organization to function well, while the role of leadership is to promote adaptive or beneficial change. (Schermerhorn, et al, 2000, p. 286)

Well-known experts in the field of management and leadership like Bennis, Drucker, Kotter, Gardner and Hickman write book after book and article after article trying to clarify the difference so that others follow a more enlightened way of moving organizations. According to numerous theories it has been proven that leaders are different from managers because they tend to take the best and present it in the character of the individual.

Leadership is valued as the most critical factor in the success or failure of an institution (Bass, 1990a) Managers need to understand their impact on employees, and ultimately on the organization. In short, leaders structure an organization and lead it to achieve pre-set organizational goals. Strategic leaders make plans, start implementing them, and control the workflow. They also support the process by giving deadlines or extending them. They evaluate performance to ensure that the direction of the organization is correct. (Elkhdr, 2019, p. 61)

In the strategic management process, it is the responsibility of the leader to analyze the situation to find the gap between the current situation and the desired one. It is further the task of the leader to draw up plans to overcome the gaps as the situation demands. (Jabbar & Hussein, 2017, p. 105)

Table 1: Leaders versus managers

Leaders	Managers
Leaders are the heart of an organization	Managers are the brain of an organization.
Motivate, encourage, and work with people	Establish systems
Create a vision and set a direction, and sharing with followers	Create rules and operational procedures.
Align people based on their knowledge, abilities and personality	Are a task-oriented and often not people- oriented.
Ask how and when	Asks what and why
Take you to a new place	Take care of where you are
Wonder that if the problem set in a new environment might require a different solution.	Think that a successful solution to a management problem can be used again.
They write business plans, set budgets and monitor progress.	They get organizations and people to change.
Do things right	Do the right thing

Source: (Colvard, 2009)

The question arises: Are leaders and managers both essential to an organization? Yes: both are essential for the prosperity of an organization. As leaders develop the vision, managers carry out

the vision. Managers must therefore recognize the importance of the leadership component of their work and be developed to become goal-achieving leaders (Raubenheimer, 2004).

A leader is a person who has achieved a leadership position through his creativity and good relationships and relationships with others; on the other hand, a manager is a person who has achieved his position through promotion. (USAID, 2016, p. 11)

- A leader directs people and purpose towards the future; the manager executes and administers the decisions
- A Leader leads a team; a manager executes decisions made by the leader
- A leader innovates, develops and initiates; a manager executes, administers and imitates.
- The manager is responsible for the planning and execution aspects; a manager is more responsible for the execution aspect
- The leader studies the problems, identifies the reasons and develops solutions so that the problems do not recur; the manager deals with immediate solutions and gets rid of them as soon as possible
- The manager is concerned about long-term planning; the manager is concerned about short-term planning

Cheng (2002, p. 53) found two repetitive elements of leadership in different definitions: 'first, leadership is about the process of influencing the behavior of others; and second, it is about developing and achieving the goal'. This view is reflected in the previous discussion on the strategy process; leaders need skills to be able to influence people and their actions, and they need to direct those actions by setting goals and creating meanings.

What is the role of leadership in strategy management?

"Leadership quality plays a key role in shaping and implementing a strategy. It functions as a link that connects the heart of the institution to its body. The pledge held by the leader is responsible for encouraging institutions to become successful, and this success comes from making effective decisions about strategy formulation and implementation. If strategies are not implemented perfectly, great strategies become irrelevant. Strategies formulated lower than 50% see the light of implementation as there is a lack of leadership skills. Managers provide guidance on what the performance path is and ways to achieve it. In general, the leader associated with an institute has a responsibility to deliver the vision, and he uses recourse strategies to reflect, adjust the plan, and oversee the operating enterprises. Moreover, he makes an effort to adapt his organization according to the needs of the circumstances. Managers spread energy-boosting activities and boost the morale and spirit of the workers. (Jabbar & Hussein, 2017, p. 100)

Instead of drowning out employees, a leader with this style encourages employees in organizational pursuit by getting the best out of them. Preventing "experimenting and hindering creativity only hinders employees who want to contribute positively and productively to the organization." leaders with inspiring motivational behaviors create vision, create communication, and manage challenging employees by encouraging, working with, and giving them autonomy. (Khan, & ET AL, 2016)

They develop a strategic vision and mission, set goals and objectives, create strategies, execute it, and then evaluate performance (James & Grasswitz 2005 & Sean, 2005).

Managers should consider any strategy as temporary because the environment is dynamic. So leaders need to focus on continuously improving the strategic management process. (James and Green, 2005).

Research shows that leadership and strategic management are significantly interrelated, meaning that leaders and strategic managers have certain special traits that help them persuade others to do what they want for organizational success. Moreover, strategic management is another form of management that creates a competitive advantage to achieve organizational objectives, it has already been mentioned that leadership has an impact on people, and it convinces them to achieve organizational objectives.

V. CONCLUSIONS

All institutions need a leader and manager; without anarchy the manager prevails, and without a leader the organization makes no progress. Strategic management contributes to the development of a sustainable business that helps organizations survive even during the economic recession. Good leaders are flexible, and they can adapt and transform their businesses to suit their needs.

Leaders make decisions that help achieve the vision so the most important role of leadership is decision making. Leaders are responsible for the proper functioning of the organization. So they have to decide what to do, how to do it and by whom. The whole strategic management process depends on the decision making of the leader. Leaders decide how to achieve goals. What kind of strategies should they be and how should they implement them. The most important role of leadership is to integrate people with the strategic management process.

Research has shown, we need to understand the culture of leadership, as defined by the collective actions of formal and informal leaders working together to influence organizational success. It is not simply the number or quality of individual leaders that determines organizational success, but the ability of formal leaders.

Strategic leadership involves conceiving and implementing successful strategies. (Stan, 2013)

Essentially leadership affects three areas of organization first, vision, second strategies themselves and finally values. These three components together create the culture of the organization. It is the responsibility of the leader to present a clear understanding of the vision throughout the organization. Everyone needs to know where we want to be in the future. Leadership as a concept has been very useful in recent decades, it is a series of behaviors that force people to formulate organizational goals and then motivate them to contribute together to achieve the goals of the organization. Managers need to choose their basic theoretical need in order to evaluate the leadership of an organization.

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Value Added Tax as an important factor of tax revenues in the Republic of Kosovo

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Abstract- The government uses different instruments to stimulate economic growth, reduce unemployment, and boost up investment, for which purpose, this system since its very beginning has gone through a number of filters of changes and improvements. Any change at the level of these instruments has a direct impact on the overall economic flow. The main purpose of this research is to analyze the role and importance of Value Added Tax (VAT) and its impact on budget revenues. It will assess the relationship between VAT and the generation of tax revenues in Kosovo, the creation of new fiscal reforms, especially related to the Value Added Tax.

In more than 120 countries, VAT is the main source of the government's revenues, which have an impact on around four billion people. This research was conducted by using secondary data which are a result of a review of the tax legislation of the Republic of Kosovo, the Ministry of Finance and various reports published over the years by the Tax Administration of Kosovo for the years 2009 - 2016. These data served to build up the hypotheses and to come up with the results. Econometric Model was also used – Precisely, in this paper work we have analyzed how VAT is the dominant factor in the tax revenues.

Index Terms- Value Added Tax, VAT escalation, Republic of Kosovo, tax incomes.

I. INTRODUCTION

Kosovo as a new country has managed to establish a sustainable tax system. By establishing the tax system Kosovo aimed at having a harmonized one with the tax system and legal framework of the European Union. Therefore, this system, from its early stage, has gone through a number of different filters of changes and improvements. The main functioning of the tax system logically is to generate revenues for the budget (especially VAT). In more than 120 countries, VAT is the main source of the income for the Government, which has an impact in the lives of around four billion people. This paperwork will explain the purpose, objectives, the hypothesis of the research, literature review and the methodology. In the final part, the analysis and interpretation regarding the VAT as an important factor of the tax incomes will be presented.

a) The subject of the research

This study aims to determine the VAT role as well as its impact in the generation of domestic revenues. The study will address this objective: It will examine the relationship between VAT and generation of the tax revenues in Kosovo.

Based on the study objectives and the information from the reviewed literature, the following hypothesis has been raised:

H0: VAT doesn't have an important relationship to the generation of incomes.

H1: VAT does have an important relationship to the generation of incomes.

b) Research methodology

The study is based on the researches of the most famous authors of this area. Literature review was mainly focused in materials, books, articles, reports of institutions, publications dealing with issues related to VAT. Globally, there were some researches with this objective, ie *Michael & Ben (2007)* which explores the reasons and consequences of VAT expansion. VAT operation should be simple, transparent and easy in terms of functioning. *Deshmukh S.M (2012)* examined in his study the VAT's economic impact in the incomes' increase and effectiveness in Maharashtra.

The methodology and the methods applied will be:

Deduction method - In this case, the functioning of the value added tax system, which is applied in most of the states worldwide, in general, has been studied and analyzed, and as a special focus has been the analysis and functioning of VAT in Kosovo and its impact on tax revenues.

Descriptive method - Different materials and reports that have been dealing with the study of taxes in general, and in particular with the value added tax in Kosovo have been collected here. In this case, literature from different authors has been used and reports (secondary data were provided by the Ministry of Finance, Tax Administration of Kosovo and other sources.)

Econometric model was also used - Precisely, in this paperwork we have analyzed how VAT influences tax revenues. For data analysis, the STATA program is used. Taxes are defined as endogenous variables, while exogenous variables are defined as VAT¹, TW² and CIT³. To study the impact of the Value Added

¹ Value Added Tax

² Tax on Wages

³ Corporate Income Tax

Tax on generation of revenue, data is collected for the period 2009-2016.

c) Types of taxes in Kosovo

A usual classification of the taxes is as follows:

- ✓ Direct taxes (CIT) & (TW) and
- ✓ Indirect taxes (VAT).

II. VALUE ADDED TAX

The American interest for VAT can be traced back to 1920s. In one way or another Americans have been talking about VAT for nearly a century. However, there are authors who associate the idea of VAT application with the name of Yale University Professor, Thomas Adams. Adams, a chief economist for taxation of his generation, suggested VAT as a replacement for existing business taxes in the US in 1921. Adams supported a broad-based tax on gross business income. In 1948, VAT was present in France but limited to several activities only. VAT is the main form in the European Union member states. As of 1989, 48 countries, mainly from the Western Europe and Latin America, but also including a small part of the developing countries, had VAT approved. However, due to its inclusive character, other countries such as Japan, China, Canada, Korea, countries in Latin America, Asia, Africa and almost all Eastern European countries had this tax also in place. VAT is not a universal term, but derives from the translation of the original term into French (taxe sur la valeur ajoutée), and can be argued as an added tax value, but is not used in this form. Some countries use the term "tax on goods and

services". VAT term is more preferred compared to other terms such as the Goods and Services Tax (GST) as it reflects more precisely the unique nature of this tax.

Kosovo has begun to implement VAT on 1 July 2001 by collecting it at a rate of 15% above the taxable value. This rate was applied until the end of 2008. As of 1 January 2009 the tax rate was increased from 15% to 16%. As of September 2015, VAT has escalated to two rates, the standard of eighteen percent (18%) and the reduced rate of 8% of the value of imported supplies and domestic taxable supplies, with the exception of exempt supplies and supplies treated as exports.

VAT is a tax collected through self-declaration of taxable persons. When billing, VAT rate applied to customers, is collected by the taxable person and allocated to the Kosovo Budget. It's applied to all supplies made to customers, which means that for all taxable supplies, VAT shall be charged.

III. THE ANALYSE OF THE RESULTS

ECONOMETRIC MODEL - Testing of the hypothesis of the paperwork is done by using the Regression Analysis. The regression equation used can be expressed as follows: $Y = a + b_1 X_1 + \dots + \mu$

When: **Y** = The total of collected revenues, **a** = constant, **B1** = Partial regression coefficient added to variable X1

X1 = VAT (Value Added Tax) **X2** = TW (Tax on Wages)

X3 = CIT (Corporate Income Tax)

Table 1: The table of incomes based on main types of taxes in Kosovo 2009-2016

Years	Incomes	VAT	TW	CIT
2009	206,681,573	75,825,276	39,227,003	55,355,226
2010	221,585,852	95,056,532	44,208,929	51,945,804
2011	261,123,163	121,437,993	55,668,304	54,564,163
2012	283,898,932	129,960,077	60,089,290	62,680,757
2013	305,451,932	149,184,989	61,962,028	64,110,827
2014	303,694,991	136,939,023	67,857,126	55,318,972
2015	332,281,049	155,153,654	72,081,313	61,433,216
2016	386,385,285	180,363,400	80,327,270	81,278,873
Total incomes:	2,301,102,777	1,043,920,944	481,421,263	486,687,838

Source: Processing data from the annual reports published by Tax Administration of Kosovo Revenues for the period 2009-2016.

The incomes based on main tax categories, the largest share from 2009 to 2016 has the value added tax (VAT), then corporate income tax and personal income tax. The clarification of the problem is done by means of a descriptive statistic of the variables

involved during the formulation of the problem, which was mentioned in the previous parts of the research methodology.

For analysing the data, the statistical software STATA 14.0 has been used.

Table 2: The results of the analysis for significance and correlation

Number of obs=	88
Prob > F =	0.000
R - squared =	0.9956

Source: Calculation of authors in the software STATA

Table 3: The results of the regression linear analysis

	P> t
Value Added Tax (VAT)	0.0000
Tax on Wages (TW)	0.001
Corporate Income Tax (CIT)	0.003

Source: Calculation of authors in the software STATA

Based on the above data we have established an econometric model in which the value "Y" is the dependent variable of the model or the tax revenue, while the value "X" represents the independent variables affecting the dependent variables.

The testing of the significant linkage which can be done by accepting or rejecting hypotheses (The zero hypothesis is accepted if the effect is not the expected one, and vice versa, if the Hypothesis 1 is accepted then the regression is in line with the theoretical predictions) shows that in the cases of incomes and VAT the alternative hypothesis or H1 which indicates that the results are in line with the theoretical forecast for the positive link between incomes and VAT should be supported or accepted. The probability value at the level of significance 95% is 0,000 for VAT and 0.00 for TW while 0.003 for CIT, ie less than 0.05.

IV. CONCLUSIONS

The VAT as an important factor in revenue generation was analysed in this study, as well as the impact of changing VAT's law. This has become possible by halving the VAT rate at 8% for basic products and increasing the VAT rate at 18% for luxury products. VAT increase has had a positive impact on TAK revenues.

The VAT threshold decreases from 50,000 euro to 30,000 euro. Thus, any business that generates an annual turnover of more than 30,000 euro will be obliged to register VAT and to pay for the part that exceeds this amount. Kosovo's budget will benefit from this VAT lowering of the threshold because more businesses will be forced to pay VAT.

Based on the data collected through throughout different reports, if we take into consideration the main types of taxes then we can realize that there was a slight increase each year. If we look

at the total tax revenues, as well as the data received from the relevant institutions, and referring to the analysis of STATA program, we can realize there is a positive trend in the tax revenues from these taxes and especially from the Value Added Tax.

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Nutritional Composition and Antioxidant Analyses of *Ageratum Conyzoides* Whole Plant

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Abstract- The use of plants and their products for different purposes has been with man from the beginning. Aside food, plants are often used as medicine, an example of such plant is *Ageratum conyzoides*. This study was undertaken to evaluate the nutritional composition and antioxidant potency of *Ageratum conyzoides* whole plant. *Ageratum conyzoides* whole plant contained in percent, moisture (5.52 ± 0.035), ash (10.47 ± 0.058), crude protein (24.53 ± 0.104), crude lipid (3.78 ± 0.069), crude-fibre (18.89 ± 0.023) and carbohydrate (36.81 ± 0.006). Mineral analysis of the whole plant (in mg/100g) revealed that the plant contained: Sodium (88.50 ± 0.346), Potassium (139.10 ± 0.006), Calcium (220.60 ± 0.173), Magnesium (110.13 ± 0.115), Iron (22.73 ± 0.289), Zinc (43.50 ± 0.173) and Phosphorus (380.13 ± 0.173). The result of proximate analyses showed that the whole plant is a good source of plant protein, minerals, crude fibre, and carbohydrate. If consumed in sufficient amount, it may contribute to mineral requirements for good health in human body. The qualitative screening for free radical scavenging compounds using 1,1-Diphenyl-2-PicrylHydrazyl (DPPH) was carried out on TLC. The result showed greater activity in the n-hexane and ethanol extracts. *In vitro* quantitative determination of free radical scavenging activity using DPPH at 25, 50, 100, 200 and 400 $\mu\text{g/mL}$ showed n-hexane extract with the highest activity (IC_{50} of $45.34 \mu\text{g/mL}$). The results of nutritional analyses showed that the whole plant is a good source of plant protein, minerals, crude fibre, carbohydrate and calories. If consumed in sufficient amount, it will contribute to nutritional requirements for good health in humans. Also the results obtained for antioxidant potentials have provided preliminary evidence for the use of *Ageratum conyzoides* in traditional medicine for the treatment of oxidative stress and free radicals.

Index Terms- *Ageratum conyzoides*, Antioxidant, Nutrient, Oxidative stress, Proximate

I. INTRODUCTION

The use of plants and their products for different purposes has been with man from the beginning. Aside food, plants are often used as medicine [8, 13, 16]. All plants produce chemical compounds as part of their normal metabolic activities. These can be divided into primary metabolites such as sugars and fats found in all plants and secondary metabolites such as alkaloids, flavonoids, tannins, saponins and phenols.

These secondary metabolites and other chemical constituents of medicinal plants account for their medicinal value

[7]. Medicinal plants often exhibit a wide range of biological and pharmacological activities such as; anti-inflammatory, anti-bacterial and anti-fungal properties. Extracts, syrups, infusions and concoctions prepared from different parts of plants are used to remedy different ailments. Such ailments include; typhoid, anaemia, malaria and headache [9]. In Nigeria many diseases were treated and are still being treated with medicinal plants with success. These diseases include malaria, epilepsy, infantile convulsion diarrhoea, dysentery, bacterial and fungal infections, mental illness, asthma, diabetes, worm infestation, pains and ulcers [17]. The efficacy of plants against ill health is possible, due to certain biologically active compounds such as nutrients and phytochemicals, which have physiological actions in the body of living organisms [9].

As various plant species are used either in the form of extract or decoction by the local people in different regions, therefore, evaluating their nutritional significance can help to understand the worth of these plants species [4]. The plant *Ageratum conyzoides* belongs to the family of *Asteraceae*. It is an erect, annual, branched, slender, hairy and aromatic plant which grows to approximately one meter in height. It is a native of Central America, Southeast Asia, South China, India and West Africa. It has been known since ancient times for its curative properties and has been utilized for the treatment of various ailments, such as burns and wounds, diabetes, headaches, pneumonia, inflammation, asthma, spasmodic and haemostatic diseases, stomach ailments, gynecological diseases, leprosy and other skin diseases [14]. The aim of this research is to evaluate the nutritional composition and antioxidant activity of *Ageratum conyzoides* whole plant.

II. MATERIALS AND METHODS

Sample collection and Treatment

Ageratum conyzoides plants were collected in July, 2019 from Dekina local government area of Kogi State, Nigeria. Prior to analyses, the sample was identified at the Botany department, Kogi State University, Anyigba, Nigeria. The specimen voucher numbers is KSU.HSN-013/02/FM-038/CD-400. The sample was air dried and pulverized, it was then stored in a polythene bag to prevent moisture.

Proximate Analysis

Determination of proximate composition was carried out using the methods reported by the Association of Official Analytical Chemists [2]. Proximate composition of a substance

constitutes the different classes of nutrients present in the samples such as carbohydrates, crude protein, crude fibre, crude lipid, ash content, moisture content and caloric value.

Mineral Analysis

The mineral content was determined according to the method described by [2]. Mineral elements (Ca, Mg, Zn and Fe) were determined using Atomic Absorption Spectrometry. After acid digestion of the plant, sodium and potassium were determined by Flame Emission Spectrometry. The phosphorus content was determined using Molybdate method with the aid of colorimeter.

Preparation and Extraction of Plant Sample

The whole plant was washed with clean water and air-dried under the shade for 14 days. It was ground to powder using wooden pestle and mortar. The powder was kept in moisture free container for further analysis. The powdered plant (75 g) was extracted sequentially with 600 mL each of n-hexane, acetone and ethanol using Soxhlet extractor for period of 3 hours. The percentage yields of the extracts were calculated.

Qualitative Determination of Free Radical scavenging compounds using DPPH

Freshly prepared DPPH solution (0.00591 g DPPH in 50 ml methanol) was sprayed on freshly developed TLC plate of each extract. Formation of yellow or white spot(s) against purple background indicates the presence of free radical scavenging compound(s).

Determination of *in vitro* Free Radical scavenging capacity using DPPH

The free radical scavenging capacity of the extracts were tested against a solution of DPPH (DPPH in methanol) using the method reported by [3]. Various concentration of the extract were prepared in methanol (25, 50, 100, 200, 400 µg/ml). The samples of the different concentration were mixed with 2 mL of the prepared DPPH. The mixture was shaken vigorously and allowed to stand in the dark at room temperature for 20 minutes. The absorbance was measured at 517 nm using UV-Visible Spectrophotometer for both samples and blank. Ascorbic acid (Vitamin C) at various concentrations was used as standard. Inhibition of free radical scavenging activity by DPPH in percent (I %) was calculated using the equation below:

$$\%I = \{(A_{blank} - A_{sample}) / A_{blank}\} \times 100$$

..... (1)

III. RESULTS AND DISCUSSION

Proximate Composition of *Ageratum conyzoides* (whole plant)

The proximate composition of the plant (Table 1 and Figure 1) shows low moisture content. This is of great importance, since

high moisture is associated with increase in microbial activities during storage [10]. The ash content of the plant (11.78±0.03 %), which represents the index of mineral elements present in the plant. The value obtained for the ash showed that the plant contained considerable amounts of inorganic elements. The crude protein content of the whole plant (*Ageratum conyzoides*) was found to be 24.53±0.104 %. The value obtained was higher when compared with the value obtained for the leaf and root (14.73%) and (9.89%) respectively as reported by [1]. This implies that the whole plant can serve as a good source of protein supplements. The crude fibre content of the whole plant is 18.89 ± 0.023 %. The value obtained was low when compared with the value obtained for the leaf and root (23.50%) and (26.74%) respectively as reported by [1]. This value fall within the recommended age 12 – 38 g/day depending on the age and sex [6]. Fibre diet promote the wave-like contraction that move food through the intestine, high fibre in food expands the wall of colon, easing the passage of waste. Fibre diet also lower cholesterol level in the blood, reduce risks of various cancers, blood diseases and improve general health and wellbeing of man [15]. The available carbohydrate content of the plant was found to be 36.81 ± 0.006%. The value obtained is in close range when compared with the values reported by [1] for the leaf and root (36.84%) and (31.06%) respectively. This shows that the plant can also serve as a good source of carbohydrate and calories. Carbohydrate is an essential part of food because; it is the major storage substance in seeds of most cultivated plants and also, the main source of energy for human body [5].

Table 1: Proximate composition of *Ageratum conyzoides*.

Parameters	<i>A. Conyzoides</i> (whole plant)	
IV. MOISTURE (% DW)	XI.	5.52±0.035
V. ASH (% DW)	XII.	10.47±0.058
VI. CRUDE PROTEIN (% DW)	XIII.	24.53±0.104
VII. CRUDE FIBRE (% DW)	XIV.	18.89±0.023
VIII. CRUDE LIPID (% DW)	XV.	3.78±0.067
IX. CARBOHYDRATE (% DW)	XVI.	36.81±0.006
X. CALORIFIC VALUE (KCAL/100G)	XVII.	1168.80±0.006

Values are *mean* ± SE of three replicates

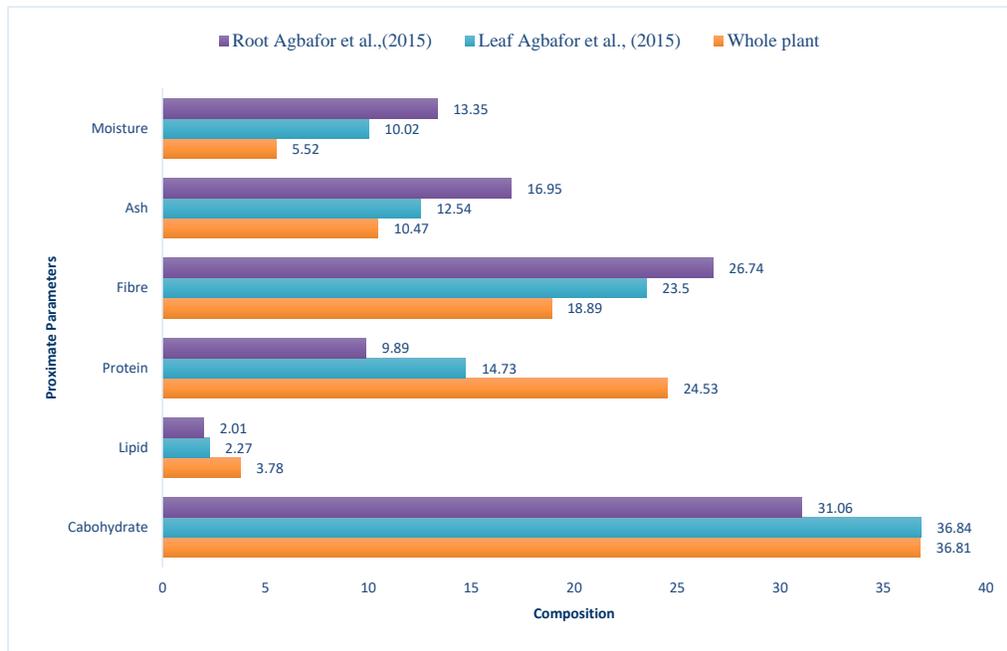


Figure 1: The proximate composition value of *Ageratum conyzoides*

Mineral Analysis of *Ageratum conyzoides* (whole plant)

The results of mineral composition (Table 2 and Figure 2) revealed that phosphorus is the most abundant in the whole plant (380.13 mg/100g), followed by calcium, potassium, magnesium, sodium, zinc and iron, with the values in mg/100g of 220.60, 139.10, 110.13, 88.50, 43.50 and 22.73 respectively. The values are higher when compared with the values reported by [1] for the leaf and root, except for sodium (Figure 2). Concentrations of the mineral elements in the whole plant are low when considering the recommended daily allowance, except for zinc and iron [11]. Although the concentration of some mineral elements is low, however, the whole plant is still a good source of mineral elements.

Table 2: Mineral composition of *Ageratum conyzoides* whole plant

Minerals	Concentration (mg/100 g)
Sodium	88.50±0.346
Potassium	139.10±0.006
Calcium	220.60±0.173
Phosphorus	380.13±0.115
Magnesium	110.13±0.115
Iron	22.73±0.289
Zinc	43.50±0.173

Values are *mean* ± SE of three replicates

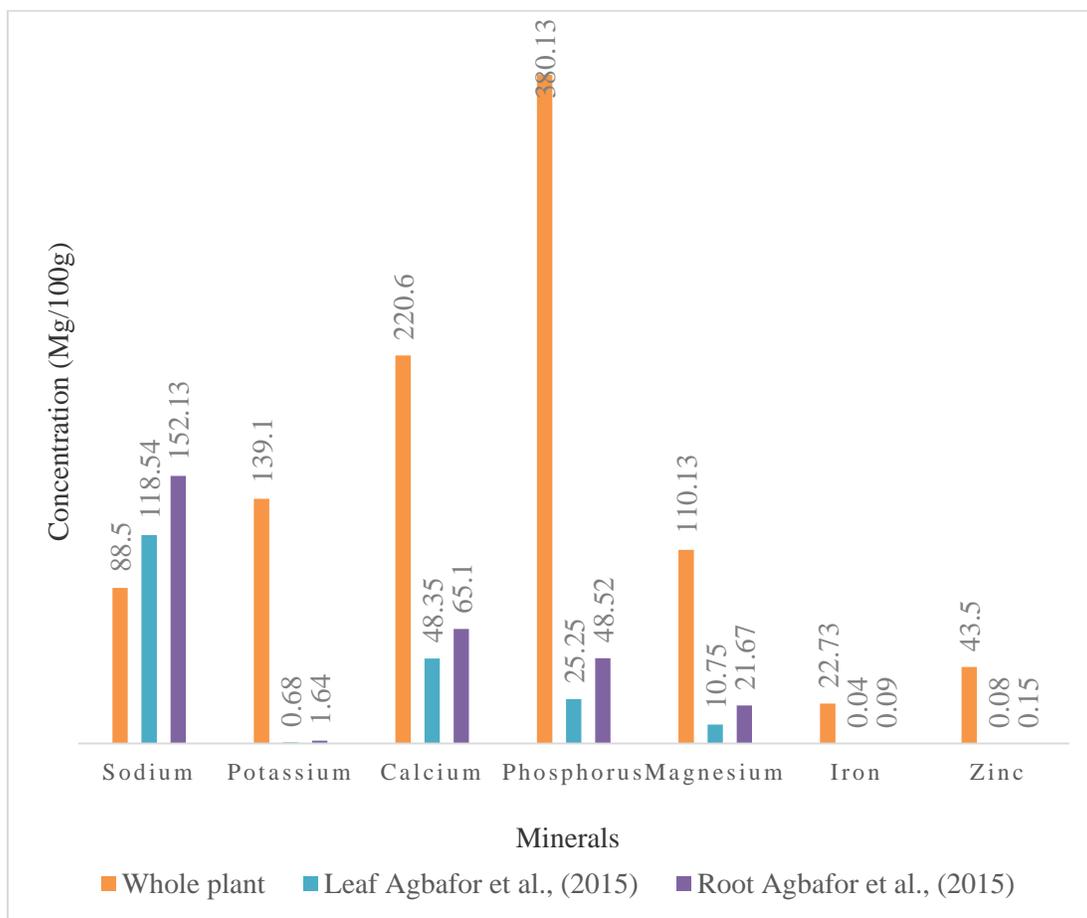


Figure 2: Mineral composition of *Ageratum conyzoides*

Qualitative free radical Scavenging Activity on DPPH

The presence of free radical scavenging compounds of the whole plant was observed in the n-hexane, acetone and ethanol extracts. However, a different degree of free radical scavenging activity was observed from the TLC plates (Table 3, Plates 1, 2 and 3). [12] reported that free radical scavenging compounds show yellow or white spots on the TLC plate. The n-hexane and ethanol extracts shows high potency as shown on the TLC plate.

Table 3: Qualitative free radical scavenging activity on DPPH

Extracts	Inference
Acetone	+
n-Hexane	+++
Ethanol	+++

Key: + = slightly active; +++ = highly active

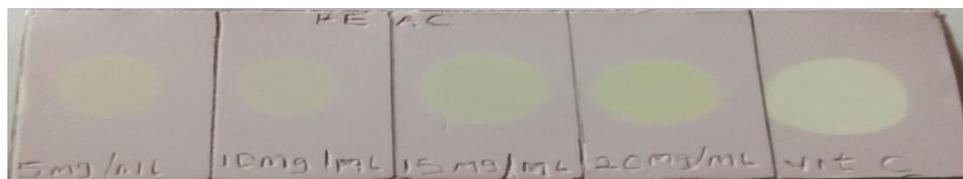


Plate 1: n-Hexane extract

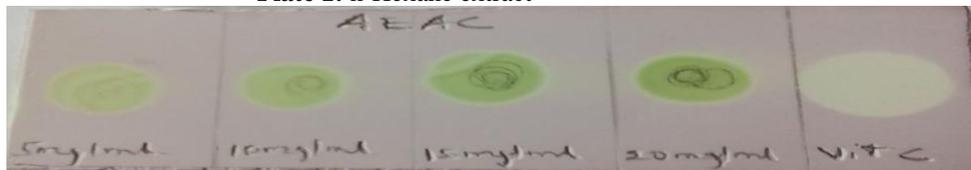


Plate 2: Acetone extract

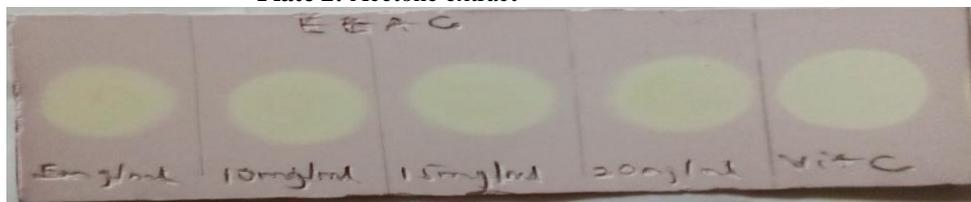


Plate 3: Ethanol extract

Figure 3: Qualitative analysis of free radical scavenging activity on DPPH.

Quantitative free radical scavenging activity using DPPH

The quantitative free radical scavenging activity of the whole plant (Table 4 and Figure 4), revealed that, the free radical scavenging potential of the extracts are concentration dependent. The n-hexane extract demonstrated the highest free radical scavenging potential (at 400 µg/mL) when compared with the other extracts. On the other hand, the acetone extract shows significant activity (at 400 µg/mL) when compared with the ethanol extract. The IC₅₀ values revealed n-hexane extract to be

more potent than the other extracts. N-hexane extract had IC₅₀ value of 45.34 µg/mL (Table 5). The lower the IC₅₀ value the more potent is the extract.

Table 4: Quantitative analysis of Free radical scavenging activity using DPPH

S/N	Concentration (µg/mL)	Zone of inhibition (%)			
		n-Hexane Extract	Acetone Extract	Ethanol Extract	Ascorbic acid
1	25	2.5±0.5	9.8±0.3	16.5±0.5	86.5±0.5
2	50	10.5±0.5	24.8±0.3	20.6±0.3	87.5±0.5
3	100	14.3±0.8	28.5±0.5	24.5±0.5	87.5±0.5
4	200	45.3±0.8	33.8±0.3	28.8±0.3	88.5±0.5
5	400	48.5±0.5	39.5±0.5	34.8±0.3	99.5±0.5

Table 5: IC₅₀ Values of the extracts

Extracts	IC ₅₀
Acetone	56.66
Ethanol	54.93
n-Hexane	45.34
Ascorbic acid	12.29

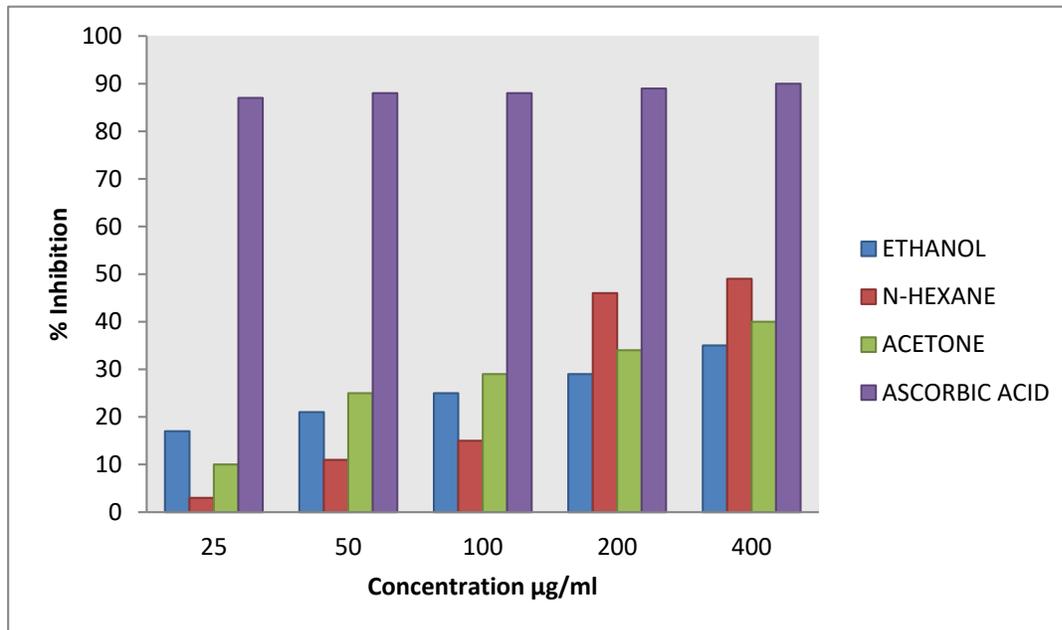


Figure 4: Showing the Free Radical Scavenging activity of *Ageratum conyzoides*

XVIII. CONCLUSION

The results of this study revealed that the whole plant of *Ageratum conyzoides* is a good source of plant protein, minerals, crude fibres, carbohydrate and calories. Therefore, if consumed in sufficient amount, the whole plant will contribute to nutritional requirements for good health in humans. However, there is need for toxicological studies to affirm the above statement. The extracts also demonstrated antioxidant activities with n-hexane extract showing the highest potency.

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Foreign Direct Investment in Nigeria for Promoting Poverty Reduction: Taking the Right Lessons and Avoiding the Wrong Lessons

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Abstract- FDI has undeniably been instrumental in the restructuring, transformation and diversification processes for poverty reduction in many developing countries of the world. However, this has not been the case with the Nigerian economy. This paper examined foreign direct investment for poverty reduction in Nigeria, taking into cognizance the right policy lessons and the avoidable policy scenarios. Using quarterly data sourced from the Central Bank of Nigeria(CBN) Statistical Bulletin, the National Bureau of Statistics and the World Bank Development Indicator (2019) from 1970 Q₁ to 2018Q₄. This paper employed the Dynamic Autoregressive Distributed Lag (ARDL) econometric approach on foreign direct investment, trade liberalization, exchange rate, inflation, interest rate and political stability variables. The choice of these variables are in consonance with the objective of the paper. The findings revealed that economic growth variable showed a negative result in the first lag but positive in the second phase, while exchange rate was positive but insignificant throughout the reviewing periods. Inflation rate was expectedly negative while political stability (proxy for democracy) was expectedly positive. Interest rate was positive but insignificant. The policy implications of these findings on FDI attraction vis-à-vis poverty reduction were discussed. This paper therefore recommended that the Nigerian policymakers should strengthen the macroeconomic reforms to ensure stability, transparency for accountability and growth-investment stimulating for FDI attraction and for policy reduction. Deepening and enduring the democratic process is also necessary for ensuring veritable investment climate in Nigeria

Index Terms- Foreign direct investment, macroeconomic reforms, economic diversification, poverty reduction, Autoregressive distributed lag, Nigeria,

I. INTRODUCTION

Foreign direct investment (FDI) is one of the measures of globalization and it's a wide spread phenomenon which is closely related to the process of economic integration. FDI from the perspective of the Balance of Payments and the International Investment Position share a common conceptual framework given by the International Monetary Fund (IMF). According to

the IMF and Organization for Economic Cooperation and Development(OECD), direct investment shows the aim of obtaining a lasting interest by a resident entity of one economy (direct investors) in an enterprise that is resident in another country (the direct investment enterprise).

FDI is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. Aggregate FDI flows and stocks generally include all financial transfers aimed at financing new investments, in addition to retained earnings of affiliates, internal loans, and financing of cross-border mergers and acquisitions (Moghalu, 2013). The accepted threshold for a foreign direct investment relationship, as defined by the OECD, is 10 per cent. In other words, the foreign investor must own at least 10 per cent or more of the voting stocks or ordinary shares of the investee company.

On the issues of the terms direct investors and direct investment enterprises, the IMF and OECD define them as follows: A direct investor may be an individual, an incorporated or unincorporated private or public enterprises, a government, a group of related individuals, or a group of related and/or unincorporated enterprises which have a direct investment enterprise, operating in a country other than the country of residence of the direct investor. A direct investment enterprise is an incorporated or unincorporated enterprise in which a foreign. Direct investment enterprises may be subsidiaries, associates or branches. A subsidiary is an incorporated enterprise in which the foreign investor controls directly or indirectly (through another subsidiary) more than 50% of the shareholders' voting power. An associate is an enterprise where the director investor and its subsidiaries control between 10% and 50% of the voting right. A branch is a wholly or jointly owned unincorporated enterprise. The international economics literature distinguishes typically between horizontal and vertical strategies to identify the benefits of firms with plants in several countries. Horizontal strategies rests on a firms' desire to access a foreign market by replicating production activities abroad. Vertical strategies involve the fragmentation of the supply chain to place production stages using a factor relatively intensively in locations that are well endowed with it. The conglomerate or diversifying strategy is seldom mentioned although in a "non-horizontal" strategy (Hijzenetal, 2008; Coedacier et al.,2009).

According to the United Nations Conference on Trade and Development (UNCTAD) Reports for 2018 and 2019, total foreign investment into Africa slumped to \$42 billion in 2017, a 21 per cent decline from 2016. Weak oil prices and harmful lingering effects from the commodity bust saw flows contract, especially in the larger commodity-exporting economies. FDI inflows to diversified exporters, including Ethiopia and Morocco, were relatively more resilient. FDI to West Africa fell by 11 per cent to \$11.3 billion, due to Nigeria's economy depressed. FDI to Nigeria fell 21 per cent to \$3.5 billion. The FDI inflow into Nigeria has mainly been in the primary sector due to the availability of natural resources from crude oil mostly. This has attracted large amount of multinational oil companies and service/telecommunication operators into the country. FDI inflow into the manufacturing sector and real sectors has not been significant.

FDI inflows into Africa defied the global downwards in 2018. They rose to \$46 billion, an 11 per cent increase after successive declines in 2016 and 2017. Rising prices of and demand for some commodities led to sustained resource-seeking investment. A few economies, such as Kenya, Morocco and Tunisia made significant recovery after several years of low-level inflows. In contrast, investment in some of the other large recipients, including Nigeria, Egypt and Ethiopia, declined in 2018. However, the expected acceleration of economic growth in Africa, progress towards the implementation of the African Continental Free Trade Area (AfCFTA) and the possibility of some large greenfield investment inflows could drive higher FDI to Africa and Nigeria in particular. Preceding signing into the AfCFTA, the Nigerian government over the years has adopted policies to attract FDI. Some of these policies are: Indigenization programme, the industrialization policy (import substitution and export promotion), the Structural Adjustment Programme (SAP), exchange rate policy, the National Economic and Empowerment Development Strategy (NEEDs/LEEDs), the Transformation Agenda and the Economic Recovery Growth Plan (ERGP). Institutionally, the Nigerian Investment Promotion Council was also established to promote and attract FDI into Nigeria. The objectives of this paper are to:

- discuss the potential effects of FDI on poverty reduction
- highlight some of the key drivers of FDI in Nigeria
- empirically estimate the relationship between FDI and the key drivers, so as to give empirical validation to this paper.

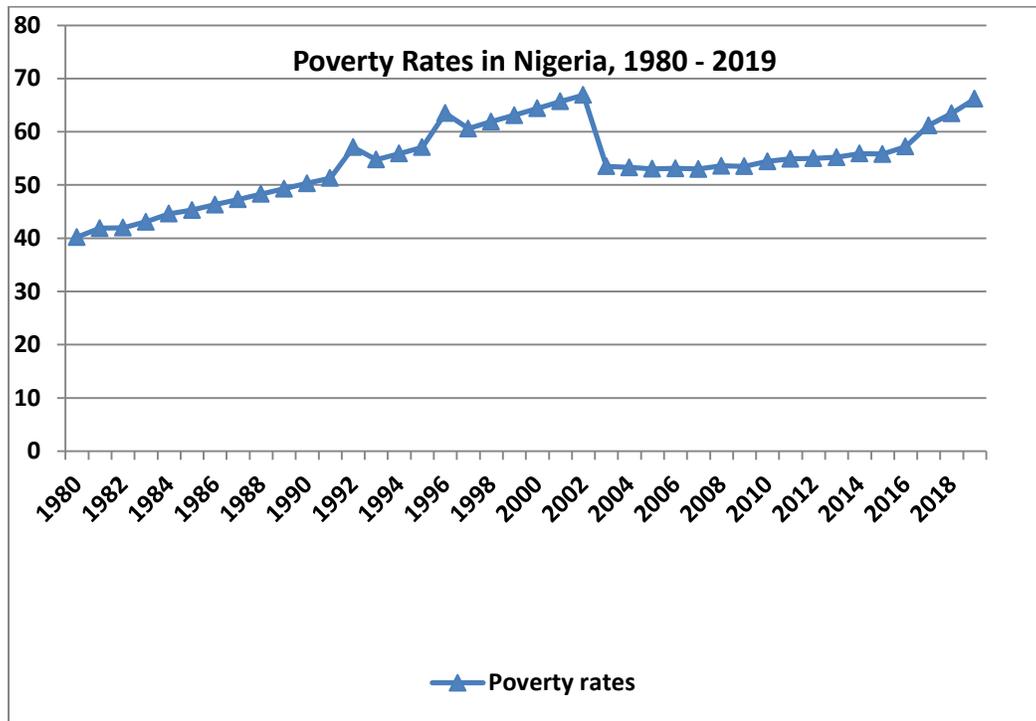
1.2 Foreign Direct Investment and Poverty Reduction

FDI's influences on poverty reduction is through two transmission mechanisms-direct and indirect channels. The indirect channel works through FDI's contribution to economic growth given the increasingly role of economic growth in poverty reduction (World Bank, 2000/2001; IFC, 2000; Dollar & Kraay, 2001a). Furthermore, FDI contributes to tax income of the government budget and may thus promote government sponsored programmes for the poor (Klein *et al.*, 2000). FDI may also induce host governments to invest in infrastructure. It may also raise total capital formation. FDI crowd in domestic investment through backward and forward linkages thereby pushing economic growth.

FDI's direct channel on poverty reduction is through providing opportunities, particularly providing jobs and training to local workers. FDI contributes to reducing existing unemployment and underemployment, providing people with income and therefore directly contributing to poverty reduction (Chudnovsky & Lopez, 1999; Saravanamutto, 1999). FDI's effect on unemployment relates in part to employment created within direct employment but also to employment created in related entities vertically and horizontally or indirect employment (UNCTAD, 1994). In the same vein, FDI raises unemployment when it is a merger- and-acquisition(M&A) activity. This follows the fact that M & A activities are fully followed by restructuring the merged enterprise in accordance with the objectives underlying the M&A (UNCTAD, 1999).

Notwithstanding these roles of FDI on poverty reduction, it is of interest to note that the level of development of the host country plays a major role in determining the degree to which the benefit of FDI are tapped for poverty reduction (Meyer & Sinani, 2009). The level of economic progress determines the ability of the country to provide local firms that are capable of deriving benefits from the entry of FDI, the necessary skilled labour force, and the ability of the host country to formulate FDI policies that help in poverty reduction. It is worthy of note, that differences in the level of economic development results in a wide margin between the benefits derived from FDI in poor and rich countries (Kemeny, 2009). The effect of foreign direct investment is strong in low income countries with high levels of social capabilities include a supportive institutional framework, effective communication, a well-educated labour force, and infrastructure support (Kemeny, 2010). Figure 1 show poverty rates in Nigeria from 1980 to 2019. The trend showed that poverty rates have been on the increase in Nigeria over the period, from 40 percent in 1980 to almost 70 per cent in 2019. Outside the disruptions in the stability of the macroeconomic fundamentals, unfavourable investment climate which deter foreign investment and FDI could account for the increase in the poverty rates in Nigeria.

Figure1: Trend of Poverty Dynamic in Nigeria, 1980- 2019.

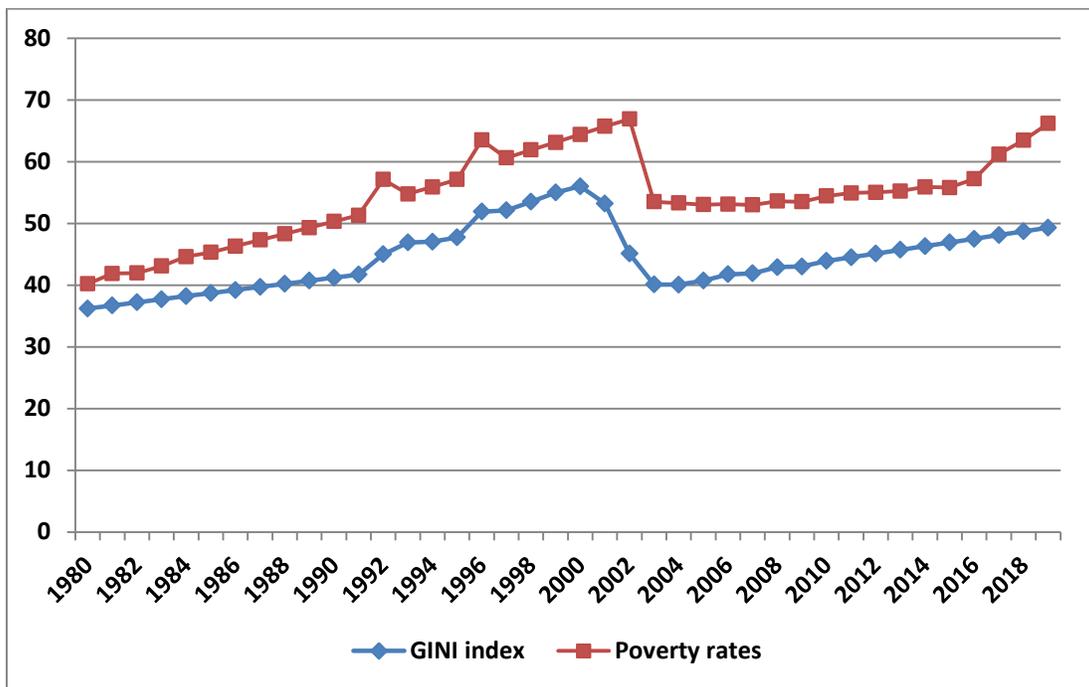


Source: CBN Statistical Bulletin (2019)

Figure 2 shows the Gini index and poverty rates of Nigeria from the period 1980 to 2018. The Gini index indicates the distribution of income in an economy over a period of time. In ideal situation, the coefficient will be equal to zero when income is perfectly distributed. The trend showed that both the Gini index and the poverty rates of Nigeria is moving in the same

direction. As poverty rate is increasing, the Gini index is also increasing. This implies that income is imperfectly distributed in Nigeria. This no doubt has severe consequences on household income and poverty reduction (Kalu & Imoagwu, 2020)

Figure 2: Trend of Gini Index and Poverty Rates in Nigeria, 1980-2018

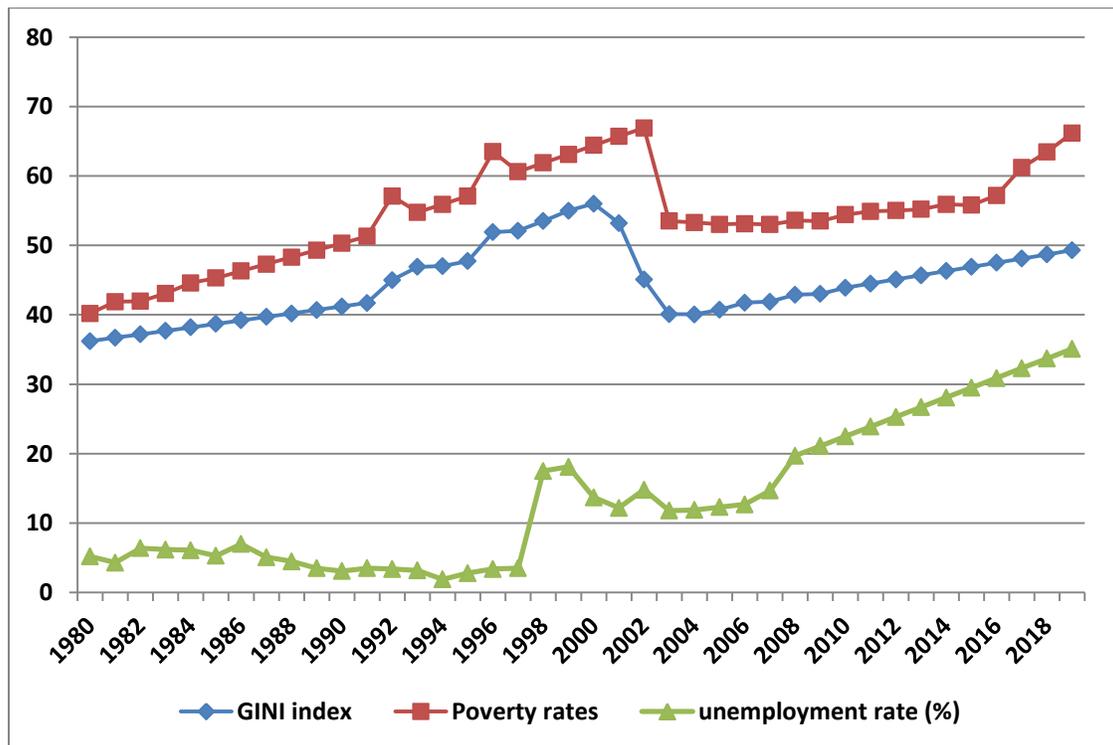


Source: CBN Statistical Bulletin (2019)

Figure 3 shows the trend of Gini index, poverty rates and unemployment rates in Nigeria from the period 1980 to 2018. The trend showed that Gini index rose from 38 percent in 1980 to 40 percent in 2018 while the unemployment rate rose from 2 percent in 1980 to 35 percent in 2018. The trend further revealed that the gap between Gini index, poverty rates and

unemployment rate is of wider margin. The implication of the wider margin could be that inequality in income distribution resulting from unemployment of the labour is the driving force behind the rising poverty rate in Nigeria.

Figure 3: Trend of Gini Index, Poverty Rates and Unemployment Rates in Nigeria, 1980-2018



Source: CBN Statistical Bulletin (2019)

II. LITERATURE REVIEW: POTENTIAL EFFECTS OF FOREIGN DIRECT INVESTMENT (FDI)

a) FDI Boosts International Trade

FDI boost international trade. Several empirical studies have examined the relationship between international trade and FDI. Clausing (2000) uses panel data approach to examine the relationship not only US outward FDI and exports but also between US and inward FDI and import from 1977 to 1994. The research finds that both inward and outward FDI will boost trade. Zhang and Li (2007) also studied the effect of inward FDI flows on total trade volume of China based on panel data with 14 investing countries from 1990 to 2004. A positive relationship was found in their study. Similarly, Rafiq and Yun (2017) concluded that FDI brings innovative technology and bring value added phenomena to domestic tradable merchandize. Qayyum and Mahood (2013) investigated the causality between FDI and foreign trade for Pakistan and its eight major trading partners for yearly data from 1985 to 2010, using the complementary approaches: vector error correction model and Johansen Fisher panel co-integration.

b) FDI Reduces Local Tension

In a study, Kolstad and Tondel (2002) finds that FDI flows are affected by ethnic tension, internal conflict, and democracy, but not by government stability, bureaucracy, external conflict, law and order and the military been involved in politics. Corroborating Kolstad and Tondel (2002), Busse and Hefeker (2007) find that government stability, internal and external conflicts, corruption, ethnic tensions, law and order, democratic accountability of government and quality of bureaucracy are highly significant determinants of FDI inflow. Although, there are contrary views on the negative effect of conflicts on FDI inflow (Wheeler and Mody, 1992; Noorbaksh *et al.*, 2001; Asiedu, 2002). FDI attraction no doubt reduces local tension when attracted into a country.

c) FDI Promotes Economic Diversification

No country has experienced sustained growth and significant reduction in poverty without integrating into the global economy. Banga (2003) have argued that FDI can foster the growth of the exportation base through the spillover effects on the level of export of the home growth firms who are involved in the traditional export sector. This spillover effect generated from the fact that the export of foreign firms in this sector lowers the fixed cost of introducing the sector's product in the foreign market. In addition to lowering the fixed cost, the home firms may also learn and gain experience from the foreign firms and become knowledgeable about the existence of new markets and openings in the foreign market. These no doubt promote the export diversification base of the home country (Rhee, 1990).

d) FDI Promotes Employment and Economic Growth

A country needs stable and productive investment inflows to ensure sustainable growth and employment creation. Effect of a rise in FDI on employment could be differentiated between greenfield and brownfield investments (Dafaux, 2010). However, brownfield investment is not used to establish a new

company, it is used for merger and acquisitions., when greenfield investment is concerned, the impact on employment is positive. However, it has a negative effect on the short-run. There are direct and indirect effects on employment associated with FDI flows to host country. Mostly in the countries where capital is relatively scarce due to negligible domestic saving opportunity, the new employment prospects have been one of the most significant impacts of FDI (Kurtishi- Kastrati, 2013). The direct effect of foreign ownership may have either positive or negative effect. Indirect effect indicates the spillover generated by the activities of foreign owned companies that are expected to affect productivity of incumbent foreign owned firms and domestic firms or in the host country.

e) FDI Promotes Tax Incentives and Tax Holidays

Most governments use tax incentives and holidays to attract a certain types of investment rather than to change their aggregate level. Oman (2001) revealed that several foreign companies- such as the automotive sector-are in a better position to negotiate special tax regimes and thus attain income from host government. Tax holidays are a common form of tax incentives used by developing countries to attract FDI. The newly established companies are not required to pay tax for a certain period of time (e.g. five years) to encourage investment. FDI promotes the establishment of tax incentive by the host in order to attract FDI into the country.

d) FDI and Reduction of Poverty

Hung (1999) analyzed the relationship between FDI and poverty reduction between 1992 and 2002 in a sample of 12 provinces and cities in Vietnam. Using poverty incidence as a measure of poverty, and using panel data, the paper found FDI to reduce poverty. Hung (1999) found that a 1% increase in FDI reduced the number of people living in poverty by 0.05%. This direct effect of FDI on poverty reduction was found to be higher than indirect effect through GDP growth.

Jalilian and Weiss (2008) investigated the effect of FDI on poverty reduction on the ASEAN countries during the period 1999 to 2007, using unbalanced panel data and the income of the bottom 20% of the population as the poverty measure. Fowowe and Shuaibu (2014) investigated the effect of FDI on the poor in a sample of 30 African countries, using pooled data from 1981 to 2011. The World Bank poverty headcount was used as a proxy for poverty. Based on the Generalized Methods of Moments(GMM), they found FDI to be good for the poor. In a similar paper, Bharadwaji (2014) studied the effect of FDI on poverty in 35 developing countries from 1990 to 2004. In the paper, FDI was used as a proxy for globalization, while the headcount ratio and poverty gap were used to measure poverty. Using a panel regression, Baradwaji (2014) found FDI to be negatively related to the headcount ratio. FDI was found to be beneficial to poverty reduction in the sample countries. On the contrary, Tsai and Hung (2007), Akinmulegan (2012), Gohou and Soumare(2012) and Oguniyi and Igber(2014) found insignificant effect of FDI on poverty reduction.

III. DRIVERS OF FOREIGN DIRECT INVESTMENT: REASONS FOR ITS LOW ATTRACTION IN NIGERIA

Some of the factors that determine a country's attraction of foreign direct investment in relation to its macroeconomic fundamentals, and influencing of sustainable growth and development includes:

- (a) **Rate of Inflation:** Incessant oscillation in the general price level (inflation) reflects unstable macroeconomic environment in an economy, resulting to increased perceived risk in investment. This further leads to negative impact on FDI inflow. Moreover, when the rate of inflation is high, the real returns on investment reduces (see Schneider & Frey, 1985; Trevino & Mixon, 2004; Tripathi *et al.* 2015). Keeping the rate of inflation down calls for responsible fiscal policies that avoid persistent shocks. It also requires a disciplined approach to monetary policy, including self-denial in resorting to domestic borrowing from monetary authorities. The persistent high rate of inflation in Nigeria is shock to economy that scares FDI inflows into the Nigerian economy
- (b) **Exchange Rate:** Increase or decrease in the value of currency of host country leads to fall or rise in the exchange rate respectively and thus makes its goods costlier or cheaper for the foreign customers. Thus, the export positive of the country changes in the international markets which further affects the FDI inflows in it. Exchange rate management has implication for private investment. Various empirical studies (Dombush, 1988; Serven 1990; Serven & Sohinano, 1993; Olofin, 1999) have shown that real exchange rate depreciation is capable of affecting private investment in at least three ways: i) through the real cost of capital ii) the real interest rate iii) through real output. The irrational pricing of the multiple exchange rates, leads to loss of confidence in the domestic currency. The outcome fuels artificial demand for forex not to invest in the economy but to hold in anticipation of further weakening of the naira.
- (c) **Interest Rate:** Interest rate is quite another important macroeconomic factor known to affect savings and investment in an economy. The existing literature established a negative relationship between interest rate in a country and FDI outflows from it. Similarly, interest rate in the host country and FDI inflows in it have a positive relationship. Thus, a higher interest rate in domestic market discourages FDI inflows due to higher returns expectation (Cleyg, 1987; Grubaugh, 1987; Krykilis & Pantehidis 2003; Lall, 1980, Prugel, 1981). The interest rate spread and high loanable fund rate are scarecrows to FDI attraction in Nigeria
- (d) **Trade Openness:** Trade openness can be explained as the degree of trade flexibility between two trading countries, is the extent to which a country has trade with other foreign nations or economies. It is computed as:

$$\text{Trade Openness} = \frac{\text{Export} + \text{Imports}}{\text{GDP}} \times 100$$

Trade openness also play major roles(s) in attracting FDI in a country. Higher trade openness should encourage more FDI inflows and vice versa (see Scaperlanda & Mauer, 1973; Scaperland & Balough, 1983; Scaperlanda, 1992). The high cost

of business registration and ease of doing business in Nigeria is a barrier to FDI establishment in Nigeria.

- (e) **Heterodox Fiscal and Monetary Policy.** Several years of heterodox monetary and fiscal practices have sunk the economy abysmally culminating in the Federal Government begging for foreign direct investment. Macroeconomic policies affect macroeconomic environment which in turn affects FDI inflows through three key transmission channels: i) fiscal deficit financing ii) uncertainty resulting from large fiscal deficits (iii) the complementarity or substitutability between private and public investment financing the fiscal deficit through creating money reduces money balances and puts pressure on interest rates. On the other hand, doing so through financial repression has negative effects. Either way, private investment is reduced, with possible effect on export and economic growth. Alternatively, financing fiscal deficits through increased foreign borrowing also limits economic growth and private investment, as it reduced investors' confidence (Olofin, 1999). When investors' confidence is eroded following ineffective fiscal policy implementation, it has a negative effect on FDI attraction, a scenario common to Nigeria
- (f) **Policy Creativity and Political Stability:** Uncertainties arise when a weak implementation of political will persist. Dombush (1998) and Rodrick (1989) emphasize the importance of investors perception of the government's willingness and ability to implement private sector oriented growth strategy. One major source of uncertainty is the lack in credibility of policy reforms or the fear of policy reversals. Usually private investors either delay investments or do not invest at all in an environment dominated by uncertainties. Basing investment incentive measure on credit, stable and predictable policy measures often has a positive impact on aggregate investment (Jayaraman, 1996).

In relation to the issue of policy reforms is the need for stability in institutions that are aimed at promoting growth and investment. Essentially, these institutions refer to rule, regulatory legal frameworks and social norms governing economic transactions. Foreign investor wants the policies of the country to be stable and transparent to provide enough safeguard for their investments because instability increases the risk to the foreign investor (Drabek & Payne, 1999).

- (g) **Real Economic Growth:** Positive economic growth trend of an economy is also among the channel through which FDI is attracted in the economy. However, the effect of FDI on economic growth has shown to be much compared to that of domestic investment due to transmission of technology. Camurdan and Cevis (2009) reported that inflation rates, the interest rate, the growth rate and the trade openness rate were the main drivers of FDI inflows into an economy. The poor nominal GDP rate expressed in per capita income which is below the standard and the low growth rate of less than 4 percent sometimes in the negative (recession) in Nigeria is a challenge to attracting FDI into Nigeria.

IV. THE MODEL AND DATA

4.1 The Model

The econometric approach is based on the dynamic autoregressive distributed lag regressions (ARDL) in an equation for foreign direct investment rate. The specification is in tandem with the dynamic regression literature and allows for the identification of the channels through which macroeconomic aggregates affect FDI over time. The theoretical/mathematical formulation is presented as follows: $FDI_t = (GDP_t, Trdop_t, EXR_t, INF_t, INT_t, POL_t)$ (4.1)

Where, FDI is the foreign direct investment variable, the dependent variable; GDP is an explanatory variable, the growth indicator; Trdop, the trade openness variable; EXER, exchange rate; INF, inflation; INT, interest rate and POL, political stability. These exogenous variables have been previously explained in the preceding section as some of the key drivers of FDI. The essence of subjecting these variables in an econometric model is to give empirical validation to the study.

First, the ARDL co-integration approach was developed by Pesaran and Shin (1999) and Pesaran *et al.* (2001). Its applications have been extensively applied to studies of macroeconomic variables like the variables of the model. It has three seemingly advantages in comparison to the Johansen/conventional methods of estimating co-integration relationships. The first one is that the dynamic analysis does not need that all the variables of interest be integrated of the same order and it can be applied when the under-lying variables are integrated of Order One, I (1), Order zero, I (0) or fractional integrated. The second advantage is that the ARDL test is relatively more efficient in the case of small and finite sample data size. The third is that by applying the techniques of derive unbiased estimates of the long-run model (Harns & Sollis, 2013. Ewun *et al.* 2015). The ARDL econometric model specifications of the included exogenous variables are expressed hereunder. The ARDL model is specified thus:

$$D(\ln(FDI_t)) = a_{01} + b_{11} \ln(FDI_{t-1}) + b_{21} \ln(RGDP_{t-1}) + b_{31} \ln(TrdoP_{t-1}) + b_{41} \ln(EXR_{t-1}) + b_{51} \ln(INF_{t-1}) + b_{61} \ln(INT_{t-1}) + b_{71} \ln(POL_{t-1}) + \sum_{i=1}^p a_{1i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{2i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(EXR_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(INF_{t-1})) + \sum_{i=1}^q a_{6i} D(\ln(INT_{t-1})) + \sum_{i=1}^q a_{7i} D(\ln(POL_{t-1})) + \epsilon_{1t} \tag{4.1}$$

$$D(\ln(RGDP_t)) = a_{02} + b_{12} \ln(FDI_{t-1}) + b_{22} \ln(RGDP_{t-1}) + b_{32} \ln(TrdoP_{t-1}) + b_{42} \ln(EXR_{t-1}) + b_{52} \ln(INF_{t-1}) + b_{62} \ln(INT_{t-1}) + b_{72} \ln(POL_{t-1}) + \sum_{i=1}^q a_{1i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{2i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(EXR_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(INF_{t-1})) + \sum_{i=1}^q a_{6i} D(\ln(INT_{t-1})) + \sum_{i=1}^q a_{7i} D(\ln(POL_{t-1})) + \epsilon_{2t} \tag{4.2}$$

$$D(\ln(TrdoP_t)) = a_{03} + b_{13} \ln(FDI_{t-1}) + b_{23} \ln(RGDP_{t-1}) + b_{33} \ln(TrdoP_{t-1}) + b_{43} \ln(EXR_{t-1}) + b_{53} \ln(INF_{t-1}) + b_{63} \ln(INT_{t-1}) + b_{73} \ln(POL_{t-1}) + \sum_{i=1}^q a_{1i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{2i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(EXR_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(INF_{t-1})) + \sum_{i=1}^q a_{6i} D(\ln(INT_{t-1})) + \sum_{i=1}^q a_{7i} D(\ln(POL_{t-1})) + \epsilon_{3t} \tag{4.3}$$

$$D(\ln(EXR_t)) = a_{04} + b_{14} \ln(FDI_{t-1}) + b_{24} \ln(RGDP_{t-1}) + b_{34} \ln(TrdoP_{t-1}) + b_{35} \ln(POL_{t-1}) + b_{36} \ln(INF_{t-1}) + b_{44} \ln(INT_{t-1}) + \sum_{i=1}^q a_{1i} D(\ln(EXR_{t-1})) + \sum_{i=1}^q a_{2i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(POL_{t-1})) + \sum_{i=1}^q a_{6i} D(\ln(INF_{t-1})) + \sum_{i=1}^q a_{7i} D(\ln(INT_{t-1})) + \epsilon_{4t} \tag{4.4}$$

$$D(\ln(INF_t)) = a_{05} + b_{15} \ln(FDI_{t-1}) + b_{25} \ln(RGDP_{t-1}) + b_{35} \ln(TrdoP_{t-1}) + b_{36} \ln(INT_{t-1}) + b_{37} \ln(POL_{t-1}) + \sum_{i=1}^q a_{1i} \ln(INF_{t-1}) + \sum_{i=1}^q a_{2i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(INF_{t-1})) + \sum_{i=1}^q a_{6i} D(\ln(POL_{t-1})) + \epsilon_{5t} \tag{4.5}$$

$$D(\ln(INT_t)) = a_{06} + b_{16} \ln(FDI_{t-1}) + b_{26} \ln(RGDP_{t-1}) + b_{36} \ln(TrdoP_{t-1}) + b_{46} \ln(INT_{t-1}) + b_{56} \ln(INF_{t-1}) + b_{66} \ln(POL_{t-1}) + \sum_{i=1}^q a_{1i} \ln(INT_{t-1}) + \sum_{i=1}^q a_{2i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(INT_{t-1})) + \sum_{i=1}^q a_{6i} D(\ln(INF_{t-1})) + \sum_{i=1}^q a_{7i} D(\ln(POL_{t-1})) + \epsilon_{6t} \tag{4.6}$$

$$D(\ln(POL_t)) = a_{07} + b_{17} \ln(FDI_{t-1}) + b_{26} \ln(RGDP_{t-1}) + b_{36} \ln(TrdoP_{t-1}) + b_{46} \ln(INT_{t-1}) + b_{56} \ln(INF_{t-1}) + b_{66} \ln(POL_{t-1}) + \sum_{i=1}^q a_{1i} \ln(POL_{t-1}) + \sum_{i=1}^q a_{2i} D(\ln(FDI_{t-1})) + \sum_{i=1}^q a_{3i} D(\ln(RGDP_{t-1})) + \sum_{i=1}^q a_{4i} D(\ln(TrdoP_{t-1})) + \sum_{i=1}^q a_{5i} D(\ln(INT_{t-1})) \tag{4.7}$$

$$q + \sum_{i=1}^q a_{6i} D(\ln F_{t-1}) + \epsilon_{7t} \quad (4.7)$$

The mode of transmission of these variables on foreign direct flow had already been discussed on section 3. However, it must be emphasized that (Sachs & Waner, 1997; Degefe, 1999) postulated that an economy is certified as open and liberalized if the following criteria were satisfied: *an average tariff rate below 40%; average quota and licensing coverage of import duty of less than 20%; no control on export in the form of taxes, quotas and state monopolies are not considered a socialist country. Furthermore, UNCTAD (1999) (173) recognized that without sufficient domestic saving to finance the investment necessary for rapid and sustained economic expansion, it may be difficult to attract FDI.* It was on these theoretical premises that our FDI model was specified.

4.2 The Data

A quarterly data set for Nigeria from 1970 Q1 to 2015 Q4 was compiled for the purpose of this paper. All data were taken from the Nigeria secondary database pool (CBN Statistical Bulletin and National Bureau of Statistics). This was complemented by the World Bank's World Development Indicator (WDI, 2019). Data were estimated using Econometric View Software (E-View 10.0). Sourcing these data were seriously challenging in terms of reliability and data accuracy, however, the various pre- and post-econometric procedure were to enhance robustness of the data.

V. EMPIRICAL RESULT AND INTERPRETATIONS

The first point of call in every time series analysis is to examine the level of integration on otherwise the stationery statistic properties of the estimated variable, and that is done here using the conventional augmented Dickey Fuller (ADF) and Philip-Perron (PP) tests. The essence of conducting the test is to ensure that the variables are not spurious or unfit for policy inference. The ADF/PP results are presented in Table 5.1

Table 5.1: ADF and PP Results

Variables	T-Statistic (levels)	Critical value at 5% (diff.)	T-stat	Critical value at 5%.
LFDI	-1.2665 (0.06448)	-6.5233*** (0.0000)	-0.8742 (0.7945)	-5.3519*** (0.0000)
LGDP	-2.26626* (0.0826)	-6.9196*** (0.0000)	-2.5251 (0.1112)	-6.8320*** (0.0000)
LOPN	-0.1790 (0.9375)	-6.3070*** (0.0000)	-0.3947 (0.9062)	-6.4686*** (0.0000)
LEXR	-0.4087 (0.9039)	-6.0722*** (0.0000)	-0.5883 (0.8689)	-6.0930*** (0.0000)

INF	-2.9057** (0.0467)	-5.0860*** (0.0000)	-3.1307** (0.0262)	-4.1588*** (0.0000)
INT	-1.6975 (0.4308)	-4.7657*** (0.0000)	-1.8583 (0.3514)	-3.2619** (0.0183)
PSTB	-0.7591 (0.82720)	-13.4907*** (0.0000)	-0.7591 (0.8277)	-13.4907*** (0.0000)

Note: (*) significant at the 10 %; (**) significant at 5%; (***) significant at the 1% values in parathensis () are the probability values

Source: Authors' Computation using EVIEW 10.0

The result of the stationarity tests show that all variables are non-stationery at levels. However, the first difference of the data series rejects the null hypothesis of non-stationarity for all the variables used in the study. It is therefore, worth mentioning that all the variable was integrated of Order One, 1 (1). Having ascertained the stationery process of the variables, we then went ahead to conduct the ARDL bounds test for co-integration. In essence, the test typically verifies the long-run relationship if there is any and the short-run dynamics (ECN) of interaction among the variables of interest (FDI, RGDP, Tradop, EXER, INF, INT, Pol), following Pesaran and Shin (1999) and Pesaran et al. (2001). The result is presented in Table 5.2

Table 5.2: Results from Bound Test

Dependent variables	K	F-statistic	Decision
FDI(RGDP,Tradop,FXR,INR,INT ,PSTB)	6	3.943890	Contegrati on
Lower-bound critical value at 5%	2.45		
Upper-bound critical value at 5%	3.61		

Source: Authors' Computation using Eview 10.0

From these results, it is clear that there exist some of co-integration (long-run relationship) amongst the variables as evidenced by the F-statistic of (3.943890), which is higher to both the lower-bound (2.45) and the upper-bound (3.61) of the 5% level of significance. Therefore, this results suggest that the null hypothesis of no co-integration between FDI and the determining variables is rejected. Table 5.3 present the ARDL short-run results.

Table 5.3: ARDL Error Correction Result

Variables	Coefficient	Study Error	T-Statistic	probability
ΔFDI(-1)	0.616187	0.061906	9.953543	0.0000
ΔRGDP	0.389176	0.121036	3.215377	0.0016

Δ RGDP(-1)	-0.210975	0.120401	-1.752262	0.0816
Δ Tradop	0.136807	0.087744	1.559157	0.1209
Δ EXER	0.020146	0.024702	0.815570	0.4159
Δ INF	-0.000194	0.000692	-0.280328	0.7796
Δ INT	0.002036	0.003492	0.582858	0.5608
PSTB	0.115176	0.046224	2.491703	0.0137
[Cont.Eq.(-1)]*	-0.118285	0.024472	-4.833454	0.0000
Cointegration=[FDI-(0.1860*[GDP+0.052*[OPEN+0.1703*LEXR-0.0016*INF+0.072*INT+0.9737*PSTBT 6.611)]				

The major concern here is the outcome of the cointegration as shown on the table, with a value of -0.118285. Theoretically, the negative significant shows appropriateness of the value and the short-run dynamics. This implies that overall, it takes abysmally 11.8 percent of the disequilibrium technically for the variables and its influencing power to be adjusted or corrected over the period. The long-run result is presented in Table 5.4

Table 5.4: Estimated long-run Coefficients using the ARDL Approach

Variables	Coefficient	Study Error	T-Statistic	probability
C	1.018627	0.282297	3.608348	0.004
LFDI(-1)	1.49902	0.061916	24.19252	0.0000
LFDI(-2)	-0.616187	0.061906	-9.953543	0.0000
LGDP	0.389176	0.121036	3.215377	0.0016
LGDP(1)	-0.578150	0.202502	-2.855037	0.0048
LGDP(-2)	0.210975	0.120401	1.752262	0.0816
LOPN	0.136807	0.087744	1.559157	0.1209
LOPN(-1)	-0.137417	0.086255	-1.591312	0.1134
LEXR	0.020146	0.024702	0.815570	0.4159
INF	-0.000194	0.000682	-0.280328	0.7796
INT	0.002036	0.003492	0.582858	0.5608
PSTB	0.115176	0.046224	2.491703	0.0137
R-Square	0.991754	mean	dependent	
Var	11.90143			
Adjusted R.Sq.	0.991211	S.D.	dependent	
Var	1.140720			
F-statistic	1825.894	Durbin	Watson	
	2.043568			

Note: P-Values and any subsequent tests do not account for model selection.

Source: Authors Computation using E-VIEW 10.0

Our focus here is to examine how the exogenous or explaining variables affect FDI in Nigeria case, for illustrative purposes. From the estimate results, the long-run GDP value as a determinant of FDI is negative, although significant, while trade liberalization proxy by trade openness in positive and significant while in the long period, it recorded negative although significant. The estimated coefficient of exchange rate although

positive is insignificant, while inflation is appropriate signed with negative outcome. Interest rate although positive has little or no value in FDI attraction. while, political stability is both positive and significant in determining FDI inflow over the period. Overall, the explanatory variables accounts for about 99 percent of the changes or variation in the dependent variables of FDI, the adjusted R-Square of 99 percent also corroborated the outcome. The overall relevance of the variables in explaining the changes in the outcome of FDI inflow into Nigeria is positive and significant at the value of 1825.894 with probability value of 0.000000. The estimated coefficients show no trace of serial disturbance with a Durbin Watson value of 2.043568. The policy implication of the empirical findings is reported in the next section. The Policy Implementation of Findings are as follows:

- Growth and productivity output needs to be improved and sustained over the period
- Much stability and transparency is required in monetary policy managements as a determinant to capital inflow.
- Political stability and credibility through democracy no doubt is a sine qua non for FDI attraction.

5. 2 Discussion of Key Findings

This section briefly describes the economic and structural consequences leading to the empirical result and that will be done in consonance with the policy implication. From the empirical results the outcomes of growth on FDI is in line with similar findings in literature. While many studies observe positive impacts of FDI on economic growth, others also reported a negative relationship. As noted by (De Mello,1997), two channels have been advanced to explain the positive relationship between FDI and economic growth. First, capital accumulation in the recipient country, FDI is expected to be growth enhancing by encouraging the incorporation of new inputs and foreign technologies in the production function of recipient economy. Second, through transfer technology, FDI is expected to increase the existing stock of knowledge in the recipient economy through labour training and skill acquisition (Borensztein *et al.* 1998). The positive relationship between FDI and economic positive growth in further lend credence by (Howhury and Mavrotas (2006) who examined the causal relationship between FDI and economic growth by using time series data covering the period 1909-2000 in three developing countries, namely Chile, Malaysia and Thailand. The findings suggest that GDP causes FDI in the case of Chile and not vice versa, while for both Malaysia and Thailand, there is strong evidence of bi-directional casualty between the two variables. From the result also, the first lad of economic growth and FDI was negative. This result is in tandem with Carkovic and Levine (2003) who concluded in their paper that FDI does promote economic growth and vice versa. Furthermore, many other studies in developing countries are mixed on the relationship between FDI and economic growth. In the class of such studies are Blomstrom & Sjöholm,1999, Aiken *et al.* 1997. Some of the reasons adduced for these mixed results are that the envisaged forward and background linkages may not necessarily be there and that the arguments of multinationals encouraging non-sub-Saharan African countries. However, that benefits are realized

more in non-sub-Saharan Africa due to greater trade liberalization. This assertion by Asiedu (2002) is in variance with the recent evidence from UNCTAD publican.

The publication reported that FDI inflows to Africa remained flat at \$54 billion, decreasing in north Africa and rising in sub-Saharan Africa. The report went further to posit that < North Africa saw its FDI flows decline by 15 percent to \$11.5 billion, while flows to sub-Saharan Africa rose by 5 percent to \$42.4 billion, (UNCTAD 2015:34) Sein (2009) argues that foreign firms that have the objectives to expand their market may resolve that in the face of a high degree of costs; the market could be better served through an export rather than FDI.

Others such as Busse and Hefker (2007) and Gliberman and Shapiro (2002) conclude that, there is no statistical significant relationship between FDI and trade openness hence, trade openness has no effect on FDI. However, the results obtained by Goodspeed et al. (2006) turned out to be inclusive with respect to openness.

The result shows that exchange rate coefficient is positive but insignificant at the 5% level. A result similar to the one obtained by Alaba (2003) and Ogunleye(2008). From Alaba (2003), the official market exchange rate volatility is not significant for FDI inflows to the manufacturing and agricultural sectors while Ogunleye (2011) concluded that the sub-Saharan African countries do not receive the desired FDI because it is constrained by exchange rate volatility. The study by (Jose Fillipe de Sousa Matric,2015) revealed that both in the short –run and long-run, real exchange rate volatility has a statistically significant negative impact on Brazilian FDI inflows.

Inflation impacts negatively on FDI in Nigeria within the reviewing period. However, a study by Anitha (2012) revealed an unexpected positive relationship between foreign direct investment and inflation in the Indian economy. Singh and Gin (2016) have given possible reasons behind the negative relationship between inflation and FDI as Follows: 1) high level of prices in the country resulting in rising production costs II) high prices adversely affecting domestic and foreign demand for commodities II) reduction in business profit IV) foreign reserves. A positive but insignificant relationship was found between interest rate and FDI. A result similar to Faroh and Shen (2015) for Sierra Leone. The no significant impact of interest rate on FDI was further given credence by Chingurande et al. (2012) for the Zimbabwean economy. The relationship between policy stability and FDI was found to be positive and significant in line with the postulation of development theory.

The results also show a positive relationship between political stability and foreign direct investment with the reviewing period. Several empirical reviews have emerged in the literature concerning political and FDI. For example, Jessup (1999) submitted that foreign direct investment increases market shares in authoritarian countries. The main reason of Tessup’s argument is based on the difference between democratic and autocratic regimes in executive constraint. FDI would prefer autocratic regimes because of less executive constraint which provides greater foreign direct investment inflows. O’neal (1994) argued that authoritarian regimes economy offers higher returns that democratic regimes economy in developing countries. The author made a differentiation between “Centre” and “Periphery” countries. According to the author, investors achieve higher

returns and have higher investment rates in democratic Centre nation but if the nation is “periphery” for Latin American countries, investors changes the preference and autocratic regimes becomes more attractive because of higher returns. Blanton and Blantum (2007) in a paper concluded that there is a significant correlation between human right and FDI, while Olson (1991) emphasizes the importance of property rights on investors and argues that if the authoritarian government is predatory, protection of property rights or getting the principal rights carries high risks. For Olson, with independent guidance’s and regular change in elected officials of strong democratic, promotes stronger property rights and so higher levels of democracy should attract more FDI (Olson, 1993; Biglaiser DeRouen 2005; Biglaiser & Daris, 2002; North, 1995).

From the empirical results, it was found out that the variables (economic growth, trade openness, exchange rate, inflation, interest rate and political stability) explain about 99 percent of the variations in the dependent variables This implies the drivers of FDI in Nigeria within the reviewing period. The Durbin value of 2.043568 shows the lack of serious disturbance of any sort on the model estimates, while the reliability of the estimate was given further authenticity by the empirical reliability check of Breusch-Godfrey Serial Correlation Test with F-statistic value of 0.76903 (p-0.999995).

VI. CONCLUSION AND RECOMMENDATIONS

This paper examined FDI for poverty reduction in Nigeria within the reviewing period. The empirical analysis was anchored on the dynamic autoregressive distributed lag model (ARDL) approach developed by Pesaran and Shin (1999) and Pesaran et al. (2001). From the empirical results, the economic growth proxy, GDP was found to be positive, but negative is the first lag. Literature posits a positive relationship between economic growth and FDI empirical evidence have proven contrary that negative growth and also influence. The negative outcome of GDP on FDI could be attributed to the slow economic growth in Nigeria over the years. This has been caused by low sector contribution to GDP rate in Nigeria. A situation that has resulted to the recession or decline in growth rate. From the result, trade liberalization was positive but negative in the first lag meaning that in the long-run, the current policies may not help in the attraction of FDI unless there is a change in the dynamics of trade policies to boost inflows. Also, exchange rate was found to be positive but insignificant implying that exchange rate management in Nigeria may not have a serious determinant of FDI in Nigeria. The big gap and the inefficient regulation of the black market window might have been the cause.

On the other hand, inflations appear appropriately signed in line with the literature, implying really that inflation sears FDI, while interest rate and political stability is positively but insignificantly related to FDI in the case of interest rate. In Nigeria, the interest rate margins of 21 percent and above may have actually scared foreign investors, who may also need domestic sources of funding. The democracy in Nigeria and the current economic reforms including the judicial reforms must contribute to the FDI inflows in Nigeria within the review period. The policy makers are therefore presented with the following right lessons:

- i) Appropriate strategies to boost economic growth and to prevent the economy relapsing into recession in the future. The sectors of the economy needs regeneration through fiscal and monetary stimuli.
- ii) Trade liberalization/policy reform should be pursued in line with Sachs and Warner (1997) criteria.
- iii) The source and gap between the official exchange rate and the black market needs to be shrink or at least close to zero.
- iv) The institutional reforms need to be strengthened and encouraged so as to attract the desired foreign direct investment in Nigeria.

The achievement of these lessons and policy prescriptions and avoidance of the wrong lessons, that FDI can only be achieved when the policymakers throttle the globe begging for business alliances and bilateral and multilateral trade and investment relations and agreements will encourage the attraction of FDI inflows into the Nigerian economy in the new and foreseeable feature. It therefore behooves on the policymakers to re-think on the existing monetary, fiscal and trade policies and making the Nigerian investment policies and environment investor friendly to attract and sustain FDI.

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Students Perception for English as a Second Language by using YouTube: A Case Study in Private University in Phnom Penh City, Cambodia

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Abstract- The main purpose of this study was to figure out the student perception for English as a Second Language by using YouTube. The questionnaire of 19 items was sent to fifty ESL participation in a University in Phnom Penh City in order to identify students' interests of YouTube in ESL classroom and to find out the students' perceptions of using YouTube in ESL classroom. There were 50 participants who responded to the questionnaire and 22 males and 28 females. The result of the study illustrated that using YouTube is so significant and beneficial for the students in term of entertainment and educational purposes. YouTube is very common tool for all the users in order to deal with the various problems. Moreover, YouTube is the most popular website as well. More researches ought to be directed progressively about the four strengths by using YouTube to join any instructing and learning approaches in the 21st century. Besides, this research ought to be led in the exploratory research.

Index Terms- *Students perception, English as a Second Language, YouTube, ESL*

I. INTRODUCTION

Cambodia is one of the ASEAN nations, with the remaining ten nations to become a member of it in 1999 (Frost, 2008). In 2019 the population of Cambodia had grown to over 16 million people (World Bank, 2020). Cambodia has 25 provinces, including the city of Phnom Penh (UNDP, 2019).

The English language has been an important tool for Cambodian students who set themselves up to grasp the worldwide economy (Sothy et al., 2015). As Clayton (2002) puts it, English is a most widely used language all through the nation since the nearness of the United Nations Transitional Authority in Cambodia (UNTAC) in 1993. From that point forward, English has been one of employment necessities in different work over the country.

Technology plays the important role for the modernization and civilization society. Especially, for the generation, who is living in the industry 4.0 acquired the technology and skill base (Anbumozhi & Kimura, 2018). YouTube is the world's largest client-driven video service provider; it has become a noteworthy stage for the dispersal of mixed media data (Wattenhofer et al., 2012).

English is the popular language and is used for business and international education (Crystal, 2012). There are two political activities in Cambodia promote the use of the English language: the UN Transitional Authority period in Cambodia (UNTAC) during 1992-1993 and the entry of Cambodia to the Association of Southeast Asian Nations (ASEAN) in 1999 (Igawa, 2008).

Cambodia recently, English language is a demand because it is so important for better career and as well as in a good living condition (Hashim et al., 2014). Most of Cambodian students try to study English, but somehow, English is still the challenges or barrier for them to pursue higher education (Chea, 2015). Igawa (2008) stated that English language education is a boom in Cambodia and Communicative competence in English means a better job and a better pay.

For the function of YouTube, it was found that the use of YouTube videos to learn English is still a recent concept, which can be used effectively to promote language learning in the classroom (Zaidi et al., 2018). Roodt and De Villiers (2011) further claimed that using YouTube as a platform to facilitate collaborative learning. In addition, using YouTube in the classroom can also present a challenge, as it can be both difficult and time-consuming to locate relevant and class-related material in YouTube's huge video storage,

particularly if the lecturer does not have a specific video clip (Burke, Snyder & Rager, 2009). As the above mentioned, this study is to investigate the student's perception of English as a Second Language by using YouTube.

Research Objectives: There were two precise objectives for this research study; to identify students' interests of YouTube in ESL classroom; to find out the students' perceptions of using YouTube in ESL classroom.

II. LITERATURE REVIEW

Perception is the capacity of a person to be conscious of what is going on in their world and to understand it. Theories of perception have developed around how the mind processes, knowledge that the sensory organs- eyes, ears, nose, and skin-send to it. These organs transmit signals to the brain, use them to create memories, make decisions and comment on issues. Hallucinations, veridical hallucinations and visual illusions are the different forms of experiences used in the theories of perception. (Hoffman, 2015).

YouTube is also an online website for video sharing that allows you to transfer content to your personal YouTube Channel – made by you or others. YouTube features comment threads you can monitor on your channel and videos, as well as a tracker that lets you track who is watching your videos (YouTube, 2011). Cheng et al., (2008) reported that since its launch in early 2005, YouTube has been the most popular Internet platform offering a new generation of short video sharing services. However, the use of a range of teaching methods and learning activities in the classroom or through online training will help enhance students' learning environment (Fill & Ottewill, 2006).

Research on using YouTube in the classroom is typically a recent area of research. By contrast, the use of YouTube and other ICT resources in language learning has become worldwide a well-known dialogue. A few researchers from various nations recommended that utilizing ICT in the classroom is ending up increasingly predominant in coming years (Klimova & Poulova, 2014; Teo et al., 2008). In the digital Education, the trade of using ICT, significantly YouTube encourages students to learn more actively and interactively. In addition, Mishna et al., (2009) claimed that, as a means of communication and socialization, the use of technology like the Internet is more than any other process

III.METHODOLOGY

Purposive sample will be applied in English as a Second Language class and it will be adopted to select the participants for this research. Purposive sampling, one of the most common sampling techniques, group participants on the basis of pre-selected parameters related to a particular research question (Mack, 2005). For this reason, purposive sampling is most effective when data review and analysis are carried out in conjunction with data collection (Mack, 2005).

In addition, the researcher utilized this testing strategy to pick just the normal and savvy scholarly execution understudies to take an interest in this study.

Instruments are adopted from Balbay and Kilis (2017).

1. Questionnaire Design

Appendix A shows the sample questionnaires about Students Perception for English as a Second Language by using YouTube

Table 1 Distribution of items

Appendix	Type	References	No. of Items
A	Section (A) Respondents details		
	Section (B) Respondents' questionnaire in using YouTube		
Perception	Student Perception for English as a Second Language by using YouTube	Adopted from Balbay and Kilis (2017).	9 items

2. Data Analysis

In this study, Quantitative data is examined by using Statistical Package for the Social Sciences (SPSS) in descriptive data.

IV. RESULTS AND DISCUSSION

For the purpose of this research, data are described in numbers, percentages and mean.

6.1 Demographic Profile of Students

A total of 50 students responded to the questionnaire which has two different sections. See the following tables respectively:

Table 1 Gender, Age, Year & Marital Status

<i>Respondents</i>	<i>Description</i>	<i>No. of respondents</i>	<i>Percentage (%)</i>
Gender	Male	22	44
	Female	28	56
	Total	50	100
Age	Under 20	7	14
	20-25	37	76
	26-30	4	8
	More than 30	1	2
	Total	50	100
Year	Second	37	74
	Third	9	18
	Fourth	4	8
	Total	50	100
Marital Status	Single	49	98
	Married	1	2
	Total	50	100

Table 1 showed that the participants of 50 responded to the questionnaire which 44% male and 66% female. Moreover, the highest age group (20-25) is 76% of the participants and most of the respondents are from the Second year. Additionally, 98% of respondents are still single.

Table 2 Experiences of students using YouTube

<i>Respondents</i>	<i>Description</i>	<i>No. of respondents</i>	<i>No. of respondents</i>
Experience of using YouTube	Everyday	38	38
	Only at Weekend	9	9
	Rarely	3	3
	Total	50	50
How often do you use YouTube	For Entertainment	28	28
	To Improve my English	22	22
	Total	50	50
Have you ever use YouTube	Yes	48	48
	No	2	2
	Total	50	50
Why YouTube is beneficial	I didn't know which playlist to watch.	17	17
	I wasted my time finding examples.	20	20
		13	13

I figured that all those examples were good examples.		
Total	50	50

Table 2 showed that 67 % of the respondent had the experience of using YouTube almost every day. In contrast, 56% of respondents use YouTube for the entertainment. However, 44% of this participant watches YouTube in order to improve their English. Additionally, either watching YouTube for entertainment or academic purposes, it would be awesome for their living. Surprisingly, 40% of respondent consider watching YouTube as wasting their time.

Table 3 The Student’s Perception of using YouTube

<i>Description</i>	<i>Mean</i>	<i>Std. Deviation</i>
Discussing the videos on YouTube makes the class more interesting.	4.20	0.75
It has been more effective to use YouTube in class than to look at slides.	3.12	0.98
The YouTube videos in classroom motivated me to improve presentation	3.44	0.95
The YouTube videos in classroom motivated me to watch more presentations than those on the playlists	3.24	0.91
The YouTube videos used in class enhanced my participation in the classroom.	3.22	0.91
Usage of YouTube videos improved my comprehension of the substance of the lesson	3.32	0.84
Watching classroom YouTube videos had positive results on improving my presentation skills	3.62	0.96
YouTube videos provide a clear source for listening comprehension practice.	3.98	0.79
If I were an instructor, I'd use videos from YouTube in my classes.	3.56	0.86

According to the results above, the descriptive statistics showed that the student's perception of YouTube videos being more interesting had a mean score of 4.20 over 5.00 and a standard deviation of 0.75. The results showed that using YouTube in class was more effective than watching slides (M=3.12, SD=0.98), the YouTube videos in classroom motivated me to improve presentation (M=3.44, SD=0.95), the YouTube videos in classroom motivated me to watch more presentations than those on the playlists (M=3.24, SD=0.91), the YouTube videos enhanced my participation in the classroom (M=3.22, SD=0.91), usage of YouTube videos improved my comprehension of the substance of the lesson (M=3.32, SD=0.84), watching classroom YouTube videos had positive results on improving my presentation skills (M=3.62, SD=0.96), YouTube videos provide a clear source for listening comprehension practice (M=3.98, SD=0.79), and If I were an instructor, I'd use videos from YouTube in my classes (M=3.56, SD=0.86).

V. CONCLUSION

This descriptive study has illustrated the student perception of English as Second Language by using YouTube that divided into different sections: student perception of using YouTube that most of the participant experience of using it and it is used in the entertainment and in the educational purposes. The overall perceptions were pretty well. It can be clear clarified on the perceptions on using YouTube: the YouTube videos in classroom motivated me to improve presentation (M=3.44, SD=0.95), the YouTube videos enhanced my participation in the classroom (M=3.22, SD=0.91), watching classroom YouTube videos had positive results on improving my presentation skills (M=3.62, SD=0.96), YouTube videos provide a clear source for listening comprehension practice (M=3.98, SD=0.79), If I were an instructor, I'd use videos from YouTube in my classes (M=3.56, SD=0.86).

This study is applicable on the effects of student perception for English as a Second Language by using YouTube among Cambodian university students. It may pave the way for the universities to implement and integrate Information Communication and Technology (ICT) tools into their existing curriculum. YouTube is very common tool for all the users in order to deal with the various problems. Moreover, YouTube is the most popular website as well.

More researches ought to be directed progressively about the four strengths by using YouTube to join any instructing and learning approaches in the 21st century. Such investigations will be noteworthy to researchers, teachers, and students in the further proficient improvement and future profession advancement in instruction area. Besides, it ought to be led in the exploratory research.

Based on the finding of this study; teachers, universities, and the Ministry of Education, should provide training to equip the Cambodian students to be ready regarding the knowledge-based web 2.0 tools, especially YouTube, which will become increasingly significant for both students and teachers in term of teaching and learning process.

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Urbanization, economic growth and industrial structure on carbon dioxide emissions: empirical evidence from Ethiopia

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Abstract- Carbon dioxide (CO₂) emissions are a leading cause of environmental pollution and have been the most significant problems for the worldwide community. This study examines the dynamic causal relationships between CO₂ emissions, industrial structure, economic growth and urbanization for the period 1980–2017 using the Autoregressive Distributed Lag (ARDL) bounds testing approach and Granger causality tests. Augmented Dickey-Fuller and the Phillips-Perron tests used to examine of unit roots of the variables. The results showed that industrial structure, economic growth and urbanization increases CO₂ emissions. The result of Granger causality test indicated that there is a bidirectional causal relationship between industrial structure, economic growth, and urbanization and CO₂ emissions. The results recommend that industrial structure, economic growth and urbanization were the main determinants of environmental pollution in Ethiopia and a series of policy actions related to industrial structure, economic growth and urbanization should be taken to reduction the environmental degradation.

Index Terms- Carbon emissions, economic growth, industrial structure, urbanization, ARDL, Ethiopia

I. INTRODUCTION

Human-related carbon dioxide emissions appear to be the major source of environmental pollution in the world (IPCC, 2007). An increase of the concentration of the carbon dioxide emission in the atmosphere is one of the most significant problems for the worldwide community. Fossil fuels are main sources of these CO₂ emissions uses of in all sectors. Thus, the world community has been able to regulator carbon emissions and deal with the low carbon economy. Some countries, such as Ethiopia has started a national policy design of the climate resilient green economy (CRGE) strategy in 2011 to deal with current as well as future impacts of climate change (FDRE, 2015)

CO₂ emissions have been increased significantly from newly industrialized countries when compared with industrialized countries (Jonathan Woetzel et al., 2019; Munir & Zhen, 2018). Global warming has reached alarming levels, raising concerns about global warming and climate change (IPCC, 2013). As a result, CO₂ emission and its relationship with economic growth has become important issue in recent years. The effects of

economic growth on CO₂ emission have become a common area of research in different disciplines.

The dynamic expansion of urbanization is a phenomenon that tends to increase social and economic ability from the rural areas to urban areas (UN, 2019). The physical expansions of urban areas lead to economic changes in many developing countries. An increase in the number of people living in cities can boost economic growth and increase trade with the rest of the world, which in turn can increase carbon emissions in the economy.

An overview of urbanization reveals flow from rural areas to urban areas associated with factors of economic activities, such as lifestyle, culture and behavior, changing industrial structure, new housing and public facilities and city size distribution (UN, 2019). Urbanization creates upward pressure on CO₂ emissions (Anwar & Younis, 2020; Frank, 2016; Niu and Lekse, 2017; Zhang et al., 2015).

Urban development provides a great opportunity for industrial development by increasing demand in cities and changing consumer attitudes in African countries (ECA, 2017). Urban expansion and industrial development increase carbon emissions (Arwar & Lsaggaf, 2019). Based on the perspective of developed and developing countries, many researchers have conducted extensive research on urban emissions and industrial development in terms of CO₂ emissions (Ke and Boqiang, 2015; Liu & Bae, 2018; Munir & Zhen, 2018; Xu & Lin, 2015).

Ethiopia's urban population is growing rapidly. According to the Central Statistics Agency, the city's population is estimated to have tripled from 15.2 million in 2012 to 42.3 million in 2037. This means that it is growing at an annual rate of 3.8 percent (CSA, 2013). Rapid urban expansion can hamper demographic problems to provide jobs, infrastructure, services and housing. Poor management of these issues has challenges with environmental pressures such as CO₂ emissions. As far as I know, there are currently no single study attempted to investigate this relationship or the dynamic impact of urbanization, economic growth, and industrial structure on CO₂ emissions in the existing literature in Ethiopia; therefore, this study contributed to the existing literature by examining the causal linkage between urbanization, economic growth, and industrial structure on CO₂ emissions in Ethiopia.

The rest of the paper is structured as follows. Section 2 refers to literature on the effects of urbanization, industrial structure and economic growth on CO₂ emissions. Section 3 refers the methodology. Section 4 refers the results and discusses of the estimates and Section 5 concludes and policy implications.

II. LITERATURE REVIEW

Several studies have empirically discussed the impacts of urbanization, economic growth, and industrial structure on carbon dioxide emissions in different regions, income levels, and countries. For example, Usama and Ozturk, (2015), used the FMOLS approach in the MENA (Middle East and North African) region during the period 1996 to 2012 and examine the effect of energy consumption, urbanization, trade openness, industrial output, and the political stability on the environmental degradation. The outcome shows that energy consumption, urbanization, trade openness and industrial development increases environmental damage. Also, (Mikayilov et al., 2017) used Autoregressive Distributed Lags Bounds Testing approach based on Azerbaijan economy during 1990 – 2014, and the outcome discloses that on average, urbanization increases carbon emissions as its 1 % upsurge could increase carbon emissions by 2.71 % in the sample countries.

Munir & Zhen, (2018) examined the linkages among industrialization, urbanization, energy consumption, CO2 emissions and economic growth a heterogeneous panel study of China from 2000 to 2016. In this study, Augmented Mean Group (AMG) estimator and Common Correlated Effects Mean Group (CCEMG) estimator was used within the analysis. The result of the study urbanization, and industrialization have a positive and statistically significant influence on CO2 emissions, also a unidirectional causality that run from urbanization and industrialization to CO2 emissions in both short- and long-term periods.

Ke and Boqiang, (2015) used the regression on population, affluence, and technology (STIRPAT) approach while investigating the influence of Impacts of urbanization and industrialization on energy consumption and CO2 emissions across 73 economies from 1971–2010, The finding shows that the impact of urbanization influences carbon emissions positively for all income groups. Yansui *et al.*, (2016) based on a panel data of 31 provinces in China over the period 1997–2010, this study empirically examines the determinants of CO2 emissions. The main finding shows that both urbanization and economic growth increase CO2 emissions.

Wang et al., (2015) were applied the panel fully modified ordinary least squares technique, and examined the relationship between urbanization, energy use and carbon emissions in different regions of Southeast Asian nations (ASEAN) countries during the period of 1980 to 2009. The findings suggest that urbanization increases carbon emissions, which means a 1% rise in urban population results in a 0.20% increase in carbon emissions. Zhang & Lin, (2012) were used the STIRPAT approach and investigated Panel estimation for urbanization, energy consumption and CO2 emissions in China from 1995 to 2010. The result discloses that urbanization increases residential carbon emissions in the eastern region.

Murat & Eyyup, (2015) used the Pedroni and Kao cointegration methods and Granger causality test based on vector error correction model (VECM) approach and investigated the nexus among urbanization, energy consumption and CO2 emissions during 1985 and 2010 in Sub-Saharan countries. The results indicated that urbanization is the main determinants of environmental pollution in these countries. Also, the recent study of Soheila & Anahita, (2019) examines the dynamic causal

relationships between CO2 emissions, energy consumption, economic growth, trade openness and urbanization from the period 1980 to 2014 employed the pooled mean group approach and panel Granger causality tests for Asian countries. The results showed that urbanization increases CO2 emissions. Abbasi et al., (2020), study attempts to analyze the influence of urbanization, economic growth, and population size on residential carbon emissions in the South Asian Association for Regional Cooperation (SAARC) member nations for the period 1994 to 2013 employ an augmented STIRPAT model. The empirical results showed that a U-shaped relationship exists between urbanization and residential carbon emissions.

III. METHODOLOGY

The purpose of this paper is to explore the impact of urbanization (share of urban population in total population), economic growth (GDP) and industrial structure (share of industry value added in GDP) on CO2 emissions for Ethiopia. The paper uses annual time series of urbanization, industrial structure, and economic growth impact on carbon dioxide emissions. Carbon dioxide emissions are taken as a dependent variable and urbanization, industrial structure, and economic growth as the main independent variables. The data used for the period of 1981-2017 from the World Bank of World Development Indicator database. The empirical models can be specified as follows:

$$CO_{2it} = f(URB_{it}, INDU_{it}, GDP_{it}) \quad (1)$$

The variables are converted into a logarithmic form for better consistency and efficient results and the mathematical form of the model as follows:

$$\ln CO_{2it} = \beta_0 + \beta_1 \ln URB_{it} + \beta_2 \ln INDU_{it} + \beta_3 \ln GDP_{it} + \varepsilon_{it} \quad (2)$$

Where $\ln CO_2$ is the logarithm of carbon dioxide emissions as measured the total carbon emissions divided by GDP measured at constant 2010 USD, $\ln URB$ is the logarithm of urbanization measured by the percentage of the urban population, who are living in urban regions, in total population, $\ln INDU$ is the logarithm of the industrial structure measured by industry value added (% of GDP) and $\ln GDP$ is the logarithm of economic growth measured by the real GDP per capita measured at constant 2010 USD, t is the time trend and ε_t is white noise error term. The parameters β_i 's are the long-run elasticity's of CO2 with respect to urbanization, industrial structure, and economic growth, respectively.

The Autoregressive Distributed Lag (ARDL) bounds testing approach employed to explore the long-run and short-run relationship between CO2 emission, urbanization, industrial structure, and economic growth. The ARDL model evaluated that the calculated F-statistic value with the critical values developed by Pesaran, Shin and Smith (2001). In the study by Pesaran, Shin and Smith (2001), the lower bound critical values variables are integrated at order zero and the upper bound critical values of variables are integrated at order one. If the computed F-statistic is smaller than the lower bound value, then the null hypothesis is not rejected and there is no long-run relationship between among the variables. The mathematical demonstrations of the ARDL approach as follows:

$$\Delta \ln CO_{2t} = \beta_0 + \beta_2 \ln CO_{2t-i} + \beta_2 \ln URB_{t-i} + \beta_3 \ln INDU_{t-i} + \beta_4 \ln GDP_{t-i} + \sum_{i=1}^{p_1} \rho_1 \Delta \ln CO_{2t-i} + \sum_{i=1}^{p_2} \rho_2 \ln URB_{t-i} + \sum_{i=1}^{p_3} \rho_3 \ln INDU_{t-i} + \sum_{i=1}^{p_4} \rho_4 \ln GDP_{t-i} + \varepsilon_t \quad (4)$$

Where Δ represents change, p is the optimum lag lengths and ε_t is the residual term. The existence of the co-integration relationship between variables from the above equation is investigated by testing the significance of the lagged levels of variables using the F-statistic or Wald-coefficient test. The null hypothesis can be tested is $H_0: \rho_1 = \rho_2 = \rho_3 = \rho_4 = 0$ and alternative hypothesis $H_1: \rho_1 \neq \rho_2 \neq \rho_3 \neq \rho_4 \neq 0$. This can determine the long-term relationship between the study variables based on the calculated F-value. The calculated F-value greater than the upper bound critical value, reject the null hypothesis. The error correction model estimate for short-term relationships is used in the ARDL test approach. The ARDL Bound testing approach is given by the following equations.

$$\Delta \ln CO_{2t} = \rho_0 + \sum_{i=1}^{p_1} \rho_1 \Delta \ln CO_{2t-i} + \sum_{i=1}^{p_2} \rho_2 \ln URB_{t-i} + \sum_{i=1}^{p_3} \rho_3 \ln INDU_{t-i} + \sum_{i=1}^{p_4} \rho_4 \ln GDP_{t-i} + \delta ECM_{T-i} + \varepsilon_t$$

Where ECM (-1) term is a lagged value of the error correction term of model in which the long-term relationship is obtained. ECM (-1) is the speed of adjustment of parameter which is to be negative and significant.

IV. RESULTS AND DISCUSSION

1.1. Results of unit root test

A unit root test was applied to determine the integration among the variables. The Augmented Dickey-Fuller,(1979) and the Phillips-Perron,(1988) tests used to examine the existence of unit roots in the variables that are either integrated with I(0) or I(1). The results of unit roots test of the variables reported on Table 1.

Table 1: Unit root test

ADF	I(0)		I(1)		PP		I(1)	
	t-value	P-value	t-value	P-value	t-value	P-value	t-value	P-value
Intercept								
lnCO2	0.449	0.9832	-4.554	0.0002	0.928	0.9934	-6.263	0.0000
lnGDP	0.581	0.9871	-5.576	0.0000	1.188	0.9959	-8.573	0.0000
lnURB	-0.928	0.7786	-5.749	0.0000	-1.275	0.6406	-4.451	0.0002
lnINDU	-1.005	0.7513	-5.504	0.0000	-0.677	0.8527	-4.269	0.0004
Intercept and Trend								
lnCO2	-2.51	0.323	-4.679	0.0008	-2.831	0.1857	-6.338	0.0000
lnGDP	-0.816	0.9643	-5.468	0.0000	-0.436	0.9857	-8.429	0.0000
lnURB	-1.837	0.6868	-5.651	0.0000	-1.636	0.778	-4.371	0.0024
lnINDU	-1.899	0.6554	-5.51	0.0000	-1.568	0.8047	-4.386	0.0023

ADF tests with intercept and with intercept and trend 1% and level of significance

As seen in the above in Table (1), all variables are non-stationary at level, but all variables are stationary at first difference. This implies that the existence of non-stationary of the null hypothesis has been rejected at 1% level of significance.

1.2. ARDL bounds test approach to co-integration

The results of the unit root test indicate the co-integration between the variables estimates. The ARDL bounds test used to examine co-integration long run and short-run relationships between the variables using F-statistics.

Table 2: ARDL bounds test

Test Statistic	Value	k*
F-statistic	7.194	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound

10%	2.72	3.77
5%	3.23	4.35
2.50%	3.69	4.89
1%	4.29	5.61

The F-statistic tests the null hypothesis of no co-integration

The results of Table (2) to verify the existence of co-integrated among the variables; the value of the F- statistics test is more than the upper value of critical value at 1%, 5% and 10 % respectively. Therefore, reject the null hypothesis of no co-integrated among the studying variables. The existence of co-integrated among the studying variables, the next step is to estimate the long-run and short -run ARDL.

1.3. Long-run and short -run ARDL estimation results

The long-run ARDL estimation results reported on Table 3 below. The coefficient of the economic growth has a positive and statistically significant at a 5 percent level in long-run. This means one percent increases in the economic growth that predicted to increases the CO2 emission by 11.56 percent in the long run. This result is consistent with the findings of Khoshnevis Yazdi & Dariani, (2019); Asim, Mustafa and Inayat, (2020); Hanif, (2018); Yansui et al., (2016) Shaojian, Guangdong and Chuanglin,

(2017). Agricultural economy the country is a major contributor to carbon dioxide and it plays an important role in exporting carbon dioxide to the world.

The coefficient of urbanization has a positive and significant effect at 1% level on carbon dioxide emission. This is indicative, a 1 % increase in the percentage of the urban population cause to 110.6 % increase in carbon emission. Khoshnevis Yazdi & Dariani (2019) ;Ponce & Marshall, (2014); Niu & Lekse, (2018); Asim, Mustafa and Inayat, (2020); Hanif, (2018); Yansui et al., (2016) ; Shaojian, Guangdong and Chuanglin, (2017); Al-Mulali & Ozturk, (2015); Liu & Bae, (2018) point out that urbanization is positively correlated with CO2 emissions.

The coefficient of industry value added is positive and statistically significant at 1% level on carbon dioxide emission. This implies that an increase of 1% in industry value-added, it will cause of 31.02 % in CO2 emissions in the long run. This result is consistent with various studies that examine such relationship of Al-Mulali & Ozturk, (2015; Asumadu-Sarkodie & Owusu, (2017; Cherniwchan, 2012; Liu & Bae, (2018).

Table 3: Long-run ARDL results

Variables	Coefficients	Std. Error	t-Statistic	Probability
lnGDP	0.1156259	0.0442533	2.61	0.014*
lnURB	1.105993	0.0680279	16.26	0.000**
lnINDU	0.3102311	0.105222	2.95	0.006**
Short -run ARDL results				
Variables	Coefficients	Std. Error	t-Statistic	Probability
lnGDP	0.5369331	0.1167403	4.6	0.0000*
lnURB	0.749462	0.148057	5.06	0.0000*
lnINDU	0.4210006	0.1119977	0.76	0.0001*
ECT (-1)	-0.6776372	0.1403059	-4.83	0.0000*

* and ** Indicate statistical significance at 5% and 1% levels respectively

The coefficient of ECM was negative and statistically significant at 1% level. This means that there is the existence of a long-run causality relationship from CO2 to economic growth, urbanization and industry value-added. The coefficient of ECM was implies that about 67.76% of the disequilibrium in CO2 of the previous year's shock adjusted back to the long-run equilibrium in the current year.

1.4. Diagnostic test of the ARDL model

Diagnostic tests incorporate Heteroskedasticity Test, Breusch-Godfrey Serial Correlation LM Test, Jarque-Bera Test, and Ramsey RESET Test. The ARDL of Heteroskedasticity was estimated by ARCH LM Test statistic. The results showed that the null hypothesis of no heteroskedasticity cannot reject at the 5%

significance level. The ARDL of serial correlation was estimated by the Breusch-Godfrey Serial Correlation LM Test statistic. The estimated result indicates that the null hypothesis of no serial correlation cannot be rejected at the 5% significance level. This means, no serial correlation exists. ARDL of functional misspecification was estimated by the Ramsey RESET test statistic. The result shows that the null hypothesis of functional form cannot be rejected at the 5% significance level. This means, there is the ARDL model in its specification form. ARDL of normal distribution was estimated by the Jarque-Bera test statistic. The result shows that the null hypothesis of the normal distribution cannot be rejected at the 5% significance level. This indicated that the residuals are normally distributed.

Table 5: Diagnostics of the ARDL Model

Diagnostic Test Statistics	Chi-Square	Probability
LM test for autoregressive conditional heteroskedasticity (ARCH)	0.606	0.4364
Ramsey RESET Test	1.87	0.16
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	1.37	0.241
Breusch-Godfrey LM test for autocorrelation	0.256	0.6128
Jarque-Bera Test for normal distribution		
lnCO2	0.308	0.85719
lnGDP	1.555	0.45963
lnURB	0.748	0.68799
lnINDU	0.783	0.67594
Joint	3.394	0.90725

1.5. Granger-causality test results

The results of the ARDL estimation for Granger Causality tests were reported on Table 5. The null hypotheses lnGDP does not Granger Cause lnCO₂, lnURB does not Granger Cause lnCO₂ and lnINDU does not Granger Cause lnCO₂, lnCO₂ does not Granger Cause lnGDP, lnURB does not Granger Cause lnGDP, lnGDP does not Granger Cause lnURB, lnINDU does not Granger Cause lnURB, lnCO₂ does not Granger Cause lnINDU, lnGDP does not Granger Cause lnINDU and lnURB does not Granger Cause lnINDU reject at 5% significant level. Therefore, there is a causal relationship carbon dioxide to economic growth, urbanization and industry value added by the chi-square test statistic. The result indicated that there is bi-causal relationship carbon dioxide, economic growth, urbanization, and industry value and unidirectional Granger causality industry value and economic growth and urbanization CO₂ emissions in Ethiopia.

Table 5: Granger-causality tests results

Null Hypothesis:	χ^2
lnGDP does not Granger Cause lnCO ₂	21.474
lnURB does not Granger Cause lnCO ₂	15.605
lnINDU does not Granger Cause lnCO ₂	21.923
lnCO ₂ does not Granger Cause lnGDP	12.673

lnURB does not Granger Cause lnGDP	19.536
lnINDU does not Granger Cause lnGDP	4.7012
lnCO ₂ does not Granger Cause lnURB	6.7105
lnGDP does not Granger Cause lnURB	26.629
lnINDU does not Granger Cause lnURB	19.403
lnCO ₂ does not Granger Cause lnINDU	15.946
lnGDP does not Granger Cause lnINDU	50.105
lnURB does not Granger Cause lnINDU	25.629

* and ** rejection of the null hypothesis at 5% and 1% significance level respectively.

1.6. The stability testing of the ARDL model

The structural stability of parameter of the ARDL model in the long-run by used the Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMSQ) of residual test for structural stability suggested by Pesaran, Shin and Smith, (2001). If the plots of statistics tests within the critical value at 5% significance level, the null hypothesis of regression coefficients are stable and can not be rejected. Figures (1) and (2), the plots of CUSUM and CUSUMSQ statistics lies within 5% critical bound for the period. Thus, the plots of the CUSUM and the CUSUMQ are lies in the boundaries and confirm the long-run coefficients stability of the model.

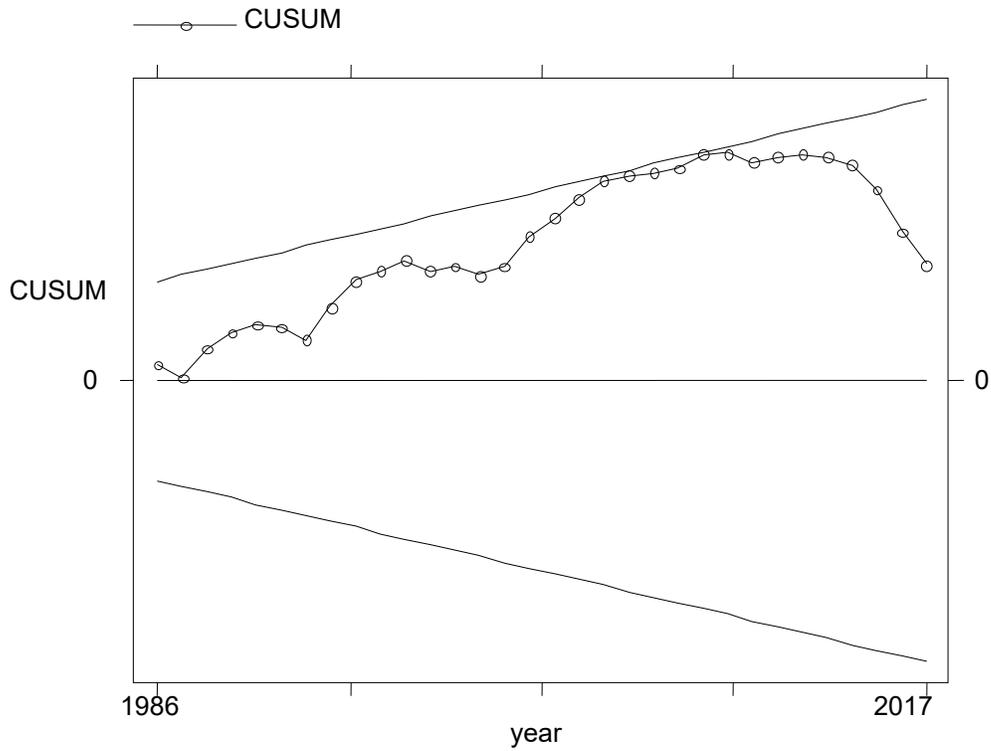


Figure 1: Plots of CUSUM statistics for stability test

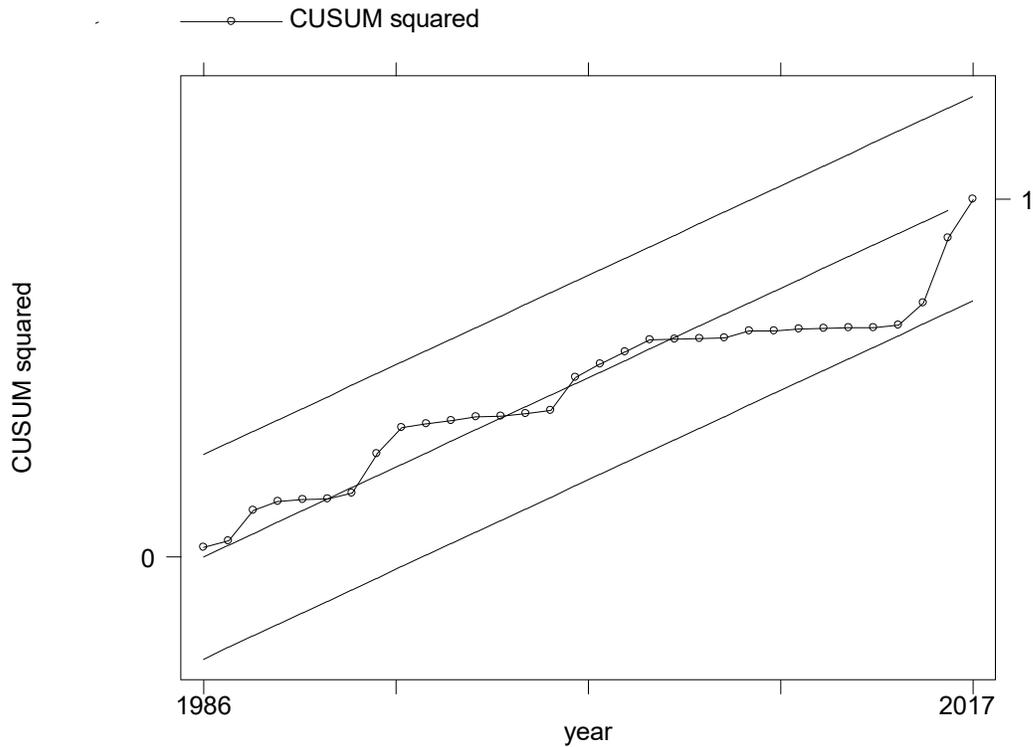


Figure 2: Plots of CUSUMQ statistics for stability test

V. CONCLUSIONS AND IMPLICATIONS FOR POLICY

This study investigated the causal relationship between industrial structure, urbanization, economic growth and CO₂ emissions in Ethiopia using ARDL approach for the period 1980–2017. ARDL methods to co-integration were applied. The result of this study showed that industrial structure, urbanization and economic growth are effect on CO₂ emission. Industrial structure, urbanization and economic growth are increasing of CO₂ emission. This implies that the important factors of CO₂ emissions in Ethiopia are industrial structure, urbanization and economic growth.

Furthermore, the study also used the Granger causality test to examine the dynamic causal relations between the studying variables. The results of co-integration test showed that the existences of long- run relationship among the Industrial structure, urbanization, economic growth and CO₂ emissions. The results of Granger causality test were a bi-directional Granger causality among industry value, urbanization, economic growth and carbon dioxide. In addition, the results indicate that there is a unidirectional Granger causality industry value and economic growth and urbanization CO₂ emissions. The empirical evidence showed that industry value, urbanization and economic growth are the key determinants CO₂ emissions Ethiopia. In order to reduction of environmental pollution or CO₂ emissions, a series action should implements by policymakers. They may develop effective urbanization plan to decline CO₂ emissions or improve environmental quality. They may improve more effective new policies that emphasis the structure of industry value and economic activities that to consider environmental quality.

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The Role of Diplomacy in the international control of arms trade

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Abstract- The arms trade has become a key one of the most widely used instruments in arms suppliers. It has led to "outdatedness" of traditional security and diplomacy instruments, such as formal alliances, the deployment of military forces abroad and threats of military intervention.

Today's leading world economic and military powers will be less likely to decide to intervene directly with their armed forces in a particular country that is considered hostile, compared to the model that involves arming a friendly country by providing weapons. A factor that contributes to the increase in the application of this model is the reduction of other classical instruments of diplomacy, like development aid.

Many countries in the world have publicly recognized the existence of cooperation between state institutions and civil society in the negotiation process as crucial for the adoption of the Arms Trade Treaty in 2013.

Index Terms- Arms.World.Trade.Economic.Diplomacy.

I. INTRODUCTION

The aim of arms trade control is to limit the number of weapons in use and to regulate their use on the basis of bilateral or multilateral agreements or arrangements. On the other hand, the disarmament process aims to eliminate a number of categories of weapons systems. The proliferation of weapons of mass destruction in the world poses a serious threat to global security.

Armed conflicts in modern world are characterized by unconventionality and distance in relation to wars defined by theory, ie "classic" armed conflicts, which were dominant during the twentieth century. Based on the analysis of contemporary conflicts, it can be concluded that they are determined by a form that is focused on predominantly unarmed activities, ie that the armed forces are used in a selective manner, and that their predominant role is to deter a potential aggressor.

In the conditions of globalization, ie growing interdependence of the market, there are numerous factors that influence the nature of the development of relations associated with the dominance of economic, media, cyber and energy elite,

which is increasingly out of ownership and control by the state or nation.

Consequently, there is a separation of interests and goals of separate centers of power, which are not always harmonized and compatible with national interests. Under the given conditions, "hybrid endangerment of national security has various manifestations, which are conditionally called hybrid warfare, but they do not represent war in the classical sense. Namely, hybrid forms of security breaches mean unarmed forms of action that disrupt the state's defense and other strategic capabilities in resistance to aggression."¹

"At the state level, there are three key categories that are link between the economy, national security and foreign policy. First, economic well-being is one of the primary state interests. Secondly, economic potential is directly related to power, and therefore, to national security. Finally, economic needs are one of the strongest internal sources of foreign policy, and, on the other hand, economic power is used to achieve important foreign policy goals."²

Economic security can be viewed from two aspects, namely:

- from an individual aspect
- from the aspect of the state.

At the international level, economic security has gained its legal basis and protection. Based on the adoption of the Covenant on Economic, Social and Cultural Rights, which, in fact, represents the concretization of the previous Universal Declaration of Human Rights adopted by the United Nations. Unlike the aforementioned Declaration, the Covenant on Economic, Social and Cultural Rights has created an obligation for states to adopt its provisions. The Covenant on Economic and Social Rights lists a number of rights, such as the right to social security, the right of every person to be able to work and earn, trade union organization, etc.

In relation to economic security, the elementary values that are protected and controlled are economic and material goods. Namely, the mentioned values are protected because poor or devastated economic conditions can have a negative effect on the internal political stability in a certain country with possible far-reaching consequences in terms of national security. The problem of economic security from the individual level is complicated and

¹ Mitrović M., "JAVNA DIPLOMATIJA U PARADIGMI HIBRIDNOG KONCEPTA SUKOBA", Ministarstvo odbrane Republike Srbije, Institut za strategijska istraživanja, VOJNO DELO, 2/2018, (2018), str. 309.

² Terriff, Terry, etc., „Security Studies Today“, Blackwell Publishers Inc., Malden, (1999). pp. 136, 137.

increased to the level of becoming a serious security problem for individual and national security.

The level of poverty in the countries of the so-called Third World has further raised with the departure of migrants and their families, primarily in search of work in more industrialized countries. This, on the other hand, brings about the emergence of nationalist and xenophobic activities by the domicile population towards newcomers, especially in Western European countries, due to the working middle class, which is afraid for its own existence, ie has fear of possible job loss.

Conditions of constant political dissatisfaction and instability in the poorest parts of the world can pose a threat to the economic security of even the richest countries and communities in the world. The leading manufacturing and marketing sectors of the United States, the European Union, and Japan are fundamentally determined by the existence of trade links with a large number of developing countries.

Economic power can be transformed into security power, including military power. Namely, it is known that weapons are paid for with money.

The economic system of a certain state produces material goods and provides the financial means necessary for the army, whose task is to protect national security.

The material goods on which the economic power of a certain state is based are:

- Natural Resources;
- material goods;
- intellectual or protected goods, capital and
- Human Resources.

Economic power can be defined as "a functional substrate of military power, both for offensive and defensive intentions. Economic instruments are important means of the state formed to realize its national interests. Especially in the age of interdependence with these means, economically strong states have the opportunity to influence in order to change the attitudes and behavior of other states. In practice, states most often use economic instruments to reward or punish a state, to induce it, or to force it to behave in a certain way. Countries with strong economies, in addition to the ability to strengthen the armed forces, also have a wider range of instruments for exercising influence. The growing interdependence of the international economic system provides more opportunities for the application of economic instruments that affect others, and a strong economy provides greater capacity for the successful application of these instruments."³

Economic compulsion is a way of using state power, such as the use of force, to ensure the achievement of political goals. There is a high degree of correlation between the power of the national economy and the influence on other countries. In other words, the greater the ability to exert influence on other states, the greater the ability to defend against the imposition of influence by other states.

³ Terriff, Terry, etc., „Security Studies Today“, Blackwell Publishers Inc., Malden, (1999). pp. 136-148.

⁴ Modelski, G., "A Theory of Foreign Policy", Pall Mall Press, London, (1962), pp. 4-11.

⁵ Prvulović V., "Ekonomaska diplomatija", Grmeč, Beograd, (2001)., str. 150.

Policy makers play a crucial role as representative agents or mediators. Although they are not neutral mediators, because their primary duties belong to the community, they constitute the essence of an instrument whose function is mediation between that community and the outside world.⁴

There are a large number of means within foreign policy procedures that are related to the economy and that can be classified into those procedures that are applied when relations between countries are normal, and coercive economic means. Within coercive means, the most commonly used are those that can generally be called economic sanctions or embargoes.

Professor Prvulović states that lately, economic sanctions have often been applied, as a foreign policy tool for resolving certain international issues, for various reasons (either unilaterally by individual states or regional organizations, or multilaterally by Security Council decisions).⁵

The nature of economic sanctions can range from the cessation or suspension of bilateral relations imposed by one state to another, or the complete cessation of cooperation only in a specific part or suspensions by certain organizations, such as blockade or isolation of the country, sanctions on arms imports, and strategic products. , all the way to complete isolation, ie interruption of all economic communications and traffic, including cultural and sports areas, (examples are the sanctions of the international community, ie the Security Council and the EU against the Federal Republic of Yugoslavia in 1992).

The reasons for imposing sanctions are quite different from previous examples from practice, from punishing racist laws and apartheid (South Africa), the inadmissibility of internal regulation, or an alliance with another competing force, which is declared a threat to national interests (Cuba), aggression on neighboring country (Iraq), non-acceptance of the elected president (Haiti), human rights issues (FRY). That's just part of the list.⁶

"The most common political reasons are the overthrow of a government, economically when a country should be punished for its market penetration or for protecting its own production, and among the military-strategic ones to preserve the monopoly of arms production, weaken other people's military capacities and prevent sales to third countries."⁷

"Another type of coercive action is armed rebellion. "A rebellion is a mass action individually and according to the number of an indefinite group of people for the purpose of violently overthrowing a social or state system or for opposing a body or a measure of state power. It is a sharp form of political struggle and it occurs due to the aggravated social relations and harsh actions of the state government, and the reason for it is often some extremely unpopular measure of power. Rebellion is often called the conflict of a nationally oppressed ethnic group with the state or national community in which it lives, or even a form of resistance to imperialist and colonial politics. A rebellion is armed if its participants, all or part of it, are supplied with weapons or

⁶ Prvulović V., "Ekonomaska diplomatija", Grmeč, Beograd, (2001)., str. 151.

⁷ Stajić Lj., "Osnovi bezbednosti", Policijska akademija, Beograd, (2003), str. 190.

weapons suitable for attack and defense. If the rebellion is led by the army, then it is a military rebellion."⁸

"Civil war is an armed struggle between class, national, political or other antagonistic groups within a state, to achieve certain political and economic goals."⁹

Weapons or military force at the local level when it comes to the relations of certain individuals or groups towards others. cannot be completely excluded, so, in accordance with that, it is necessary to elaborate what it means to interfere in the internal affairs of a certain state, what violence is and the like. It is necessary to strive for every person on the planet to have a place to live, to harmonize relations between people, to make available to every person what is essential for a normal life: water, food, a healthy environment, energy, etc.

"In science one can find views on the relationship between foreign policy, and the defense-military component, in the view that in a period of peace, the military-defense complex contributes to foreign policy, and in a period of war it becomes foreign policy."¹⁰

Viewed through a historical prism, "weapons and military equipment were the exclusive means of soldiers who achieved political goals by force. However, in the modern age, weapons and military equipment are an exceptional instrument of diplomacy, more specifically defense diplomacy. The arms and military equipment trade is a kind of link between defense and diplomacy, which under certain conditions can be used for discreet diplomatic pressures and strengthening political influence abroad. In addition to the undoubted economic benefits from the export of weapons and military equipment, the purpose-built industry also represents a kind of link between diplomacy and the defense system. However, the trade in arms and military equipment poses a number of problems for political structures, as the interests and attitudes of the Ministry of Foreign Affairs and Defense do not always have to be identical with regard to export licenses."¹¹

The strength of a country's armed force is what affects the degree of reputation it enjoys internationally. The strength of the armed force means the number of people, the quality of weapons, the equipment with appropriate equipment and its readiness to engage in achieving the set tasks and goals. During the so-called Cold War, the United States, within the doctrines of deterrence and containment, introduced huge changes in the previous understanding of the concept of war, that is, it created a concept called "projection of forces on distant battlefields".

The Soviet Union also used military force to conduct foreign policy, resulting in the so-called arms race between the Soviet Union and the United States during the decades of the twentieth century.

At the beginning of the 1990s, the so-called Eastern Bloc led by the Soviet Union was overthrown, that is, it disappeared, so the North Atlantic Alliance or NATO led by the United States of America survived on the historical scene. In that way, an

imbalance was established in terms of military forces, which characterized the period of the Cold War, which led to the intensification of military interventions in the practice of modern international relations.

The goal of these military interventions was not related to the occupation and de facto control of a certain territory, but the goal was to impose "own political concepts, ensure vital national interests, support endangered political regimes, secure markets for own industry, protect and control energy and raw material supply routes." maintaining a military presence in important regions and more. Within military interventions, diplomacy has a significant place. It has an obligation to prepare political and legal conditions suitable to justify military intervention, in accordance with the foreign policy of the great powers."¹²

In addition to classical diplomacy, various forms of diplomatic methods are used, such as secret diplomacy, diplomacy of pressure by military, political and economic means, and numerous others. War and diplomacy have certain specifics. The activities of diplomacy are primarily realized through protocol flows, with the necessary consideration of the partner side and the third party, with refined and sophisticated forms of communicating certain political views of the leadership of a certain state. War, on the other hand, represents a kind of test of power and means direct opposition of the opponent in order to impose one's own will by using military force.

War, in the essential sense, represents a kind of antithesis to diplomacy. However, both of these forms of manifestation of the political will of the state and its attitude towards foreign countries have the same final goal, ie both forms have the goal of imposing their own political will on the opposite side. The logic of war and the logic of diplomacy are in essence opposed, but they are harmonized to the extent that they both serve the realization of the foreign policy goals of a certain state. War achieves those goals that could not be achieved through diplomacy, and is pursued as long as their purpose exists. When war loses its purpose, then diplomacy is put into function again, which ends the war and establishes a status that satisfies the needs of the foreign policy of a certain state.

The emergence of nuclear weapons had a certain impact on diplomacy, ie the need for communication and avoidance of conflict situations in relations between the blocs that existed during the Cold War. The United Nations was formed, with a similar task as the League of Nations, but, unlike the League of Nations, the Charter of the United Nations, which brought together all countries of the world under its auspices, defined the active engagement of the United Nations in case of violations of its provisions. respect for the influence of great powers on international relations.

The Vienna Convention on Diplomatic Rights and Immunities, which is a kind of documentation of diplomatic law

⁸ Mijalković, Saša V., "Nacionalna bezbednost", Kriminalističko-policijska akademija, Beograd, (2009), str. 210-211.

⁹ Mijalković, Saša V., "Nacionalna bezbednost", Kriminalističko-policijska akademija, Beograd, (2009), str. 213

¹⁰ Gavranov, V., Stojković M., "Međunarodni odnosi i spoljna politika Jugoslavije", Savremena administracija, Beograd, (1972)., str. 290-291.

¹¹ Stefanović-Štambuk J., "Diplomatija u međunarodnim odnosima", FPN i Čigoja, Beograd, (2008)., str. 29.

¹² Freeman W. Chas Jr: Arts of Power - Statecraft and Diplomacy, United States Institute of Peace Press, Washington, D.C., (2002). pp. 79-81.

on which the regulation of modern diplomacy is based, was adopted under the auspices of the United Nations, in Vienna.

It is safe to say that in modern foreign policy relations, the saying "capital turns the world" dominates. "Namely, it was also confirmed in the security sphere. Despite being regulated by various agreements, the legal trade in conventional arms within the international community still hides secrets that are essentially profitable and the realization of the national interests of the great powers and multinational companies, which are directly involved in this activity. Thus, profit has become a priority in decision-making related to the military industry and arms sales. Combined with the interests of political elites and state interests, the arms trade maintains a continuity of overcoming political means that are an integral part of international institutions for maintaining stability, peace, respect for human rights and democracy.

Countries in crisis regions, as end users of the services of developed countries - leaders in the production of weapons, are the most common target group that offers opportunities for political and economic prestige in the security space. Sometimes the authorities of individual countries, in the arms race as a way to increase their own military power, even in the absence of direct armed conflicts, influence the weakening of the living standards of their citizens. In this way, the regions to which some of these countries belong become less popular for investment and economic development. The paper explains the connection

between profits and the arms trade, globalization and conflict. The paper relies on official sources on arms trafficking in the world over the past two decades."¹³

The dilemmas posed by the international arms trade and faced by decision-making authorities (governments, above all), which relate to arms trade requirements, stem from difficulties in deciding whether a particular arms transfer will be "positive" or "negative". This can best be illustrated by an analysis of the justifications that are usually given for the sale of arms or the grant of arms to a particular state. The arms trade forms a kind of link between defense and diplomacy that can be used to create and develop, often, indirect diplomatic pressures and strengthen influence in the field of foreign policy. In addition to the economic benefits of arms exports, the defense industry is also a link between diplomacy and a country's defense system. However, the arms trade also brings a number of problems to the representatives of the political establishment, given that the interests and attitudes of the foreign and defense ministries of a country do not have to be the same in every situation regarding the issuance of arms export licenses.

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¹³ Petreski D., Rajkovčevski R., "Trgovina oružjem - između globalizacije, sigurnosnih strategija, konflikata i profita", NBP, Nauka, bezbednost, policija,, vol. 17, br. 1, (2012)., str. 89-106.

Analysis Factors Influencing Use of IUD Contraception on Postpartum Mothers in Dr. Doris Sylvanus Hospital Palangka Raya

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Abstract- The use of IUD contraception in postpartum mothers is a safe, effective, and convenient method for women, and is the best opportunity to control postpartum fertility. The use of IUD contraception in postpartum mothers can be influenced by several factors, including education, husband support, information and counseling, and health status. This research aims to analyze the effect of education, husband support, information and counseling, and health status on the use of IUD contraception in postpartum mothers at dr. Doris Sylvanus Hospital Palangkaraya. This is quantitative research with a case-control design. Sample is 158 respondents using purposive sampling method. The research instrument uses secondary data that is registered and medical records. Data analysis is descriptive and analytical, i.e., chi-square and multiple logistic regression. Respondents who have low education will not use IUD contraception ($p=0.000$). Respondents without husband support will not use IUD contraception ($p=0.000$). Respondents who are not provided with information and counseling will not use IUD contraception ($p=0.000$). Analysis using multiple logistic regression showed educational variables ($p= 0.001$; $Exp.B=5.403$), husband support ($p=0.000$; $Exp.B= 8.675$), and information and counseling ($p=0.000$; $Exp.B=7.934$) with a confidence level of 95%. There was no influence on the health status of the use of IUD in postpartum mothers. There was an influence of education, husband support, information, and counseling with the use of IUD on postpartum mothers. The husband supports the most dominant of the three variables.

Index Terms- education, husband support, information and counseling, health status

I. INTRODUCTION

The postpartum period is an important time to start contraception but is still underused. Many things contribute to unwanted pregnancy, including lack of patient knowledge, ineffective contraceptive methods, inconsistent use of contraception, unplanned sexual activity, and contraceptive failure

(1). Postpartum IUDs are non-hormonal contraceptives that do not have side effects such as hormonal contraception, IUD contraception is safe contraception because in addition to high usability the contraceptive IUD also provides long-term protection for up to 5-10 years (2). Components that influence the behavior of contraceptive use are socio-demographic factors such as age, occupation, number of children, education, and family income. Socio-psychology factors such as men's knowledge about contraception, availability of male contraception, distance to the place of service, information and counseling as well as factors that influence the use of health services such as contraception such as health status, service providers, service acceptance and environmental risk factors (3). Increased morbidity in mothers due to side effects of hormonal contraception, such as hypertension and breast cancer (4). In Indonesia, the number of active family planning acceptors is 63.27%, IUD users only 7.35% (5). In The Central Kalimantan, postpartum family planning participant as many as 35.3% of those planning the postpartum least used is the IUD 1.3% (6). Dr. Doris Sylvanus Hospital shows that from 1635 mothers delivered in the delivery room, only 29 Mothers who use IUD contraception postpartum with a percentage of 1.77%. In 2017, from 1921, there were only 36 women who used postpartum IUD contraception with a percentage of 1.87%. In 2018 out of 1720 women giving birth to only 20 mothers using postpartum IUD contraception with a percentage of 1.16% (7).

The low coverage of the use of postpartum IUDs is still far from the target of using long-term contraceptive methods (MKJP) in the 2015-2019 RPJMN is 23.5% (8). With the above problems, the research will be conducted to analyze factors influencing the use of IUD contraception in postpartum mothers in dr. Doris Sylvanus Hospital Palangka Raya in 2019.

II. RESEARCH METHOD

The study begins by determining the case of postpartum mothers who are not acceptors of postpartum IUD contraception and determining the control, namely postpartum mothers who become acceptors of postpartum IUD contraception. Then they are traced retrospectively whether any factors influence it from

education, husband support, information and counseling, and health status. This study uses secondary data from medical records and registers using checklist sheets as a tool for data collection. The population in this study were all postpartum mothers in dr. Doris Sylvanus Hospital Palangkaraya. The sampling technique in this study was purposive sampling.

III. FINDINGS

Table 1. Univariate Analysis of Research Variables

Variable	Category	Frequency			
		Case	%	Control	%
Education	Low	37	46.8	10	12.7
	High	42	53.2	69	87.3
Husband support	Not supported	64	81.0	20	25.3
	Supported	15	19.0	59	74.7
Information and counseling	Non exposed	45	57.0	6	7.6
	Exposed	34	43.0	73	92.4
Health status	No medical indication	42	53.2	44	55.7
	With medical indication	37	46.8	35	44.3

Based on the above table, it is known that both in the case group and in the control group the majority of respondents with higher education. There were 53.2% of respondents in the case group and 87.3% of respondents in the control group with higher education. The level of education is one of the factors that determine a person's knowledge and perception of the importance of something, including the importance of participation in family planning (9). Higher education levels are able to absorb information and are better able to consider things that are beneficial or side effects to health. The level of education greatly influences a person to act and look for causes and solutions in his life. Educated people will more easily accept new ideas, higher education referred to here is a high school education or equivalent and college (10). In the case group, the majority of respondents did not support her husband while in the control group, majority of respondents there supported her husband. There were 81.0 % of respondents in the case group with no husband support and 74.7 % of respondents in the control group with no husband support. The husband's support is an encouragement given by the husband in the form of moral and material encouragement in terms of realizing a plan, which in this case is the selection of contraception. Support makes the family able to carry out its functions because family members are supposed to provide mutual support and pay attention to the wife's health conditions and needs. The husband's support is very important for the wife, especially in planning family life as well as in determining the family planning method to be chosen (11).

According to the table above, it is known that both in the case group the majority of respondents did not receive information and

counseling were 57.0 % of respondents in the control group were 92.4% of respondents there is given information and counseling. Counseling is the process of exchanging information and positive interactions about family planning, carried out between prospective family planning participants and staff to help prospective family planning participants recognize their family planning needs and choose the best solution and make decisions in accordance with the conditions faced. Counseling also a process of delivering and receiving messages to improve the knowledge, attitudes and behavior of pregnant women/mothers postpartum/breastfeeding women or mothers after a miscarriage and family/partner, can be done directly/indirectly via a communication channel to receiver message to be able to use contraception directly (12).

It is known that both in the case group and in the control group, the majority of respondents in the use of postpartum IUD contraception with health status had no medical indication. There were 53.2 % of the respondents in the case group, and 55.7 % of respondents in the control group with health status are not medically indicated. Health status can give an idea of a person's physical quality. For example, someone who is sick (infectious or non-infectious, infectious, cardiovascular). Health status is also a state of position of people at a healthy or sick level (13).

Table 2. Bivariate Analysis with Chi-Square Test

Variable	Postpartum Mother				p-value	OR
	No IUD		With IUD			
	n	%	n	%		
Education						
Low	37	46.8	10	12.7	0.000	6.079
High	42	53.2	69	87.3		
Husband's support						
Not supported	64	81.0	20	25.3	0.000	12.587
Supported	15	19.0	59	74.7		
Information and counseling						
Non exposed	45	57.0	6	7.6	0.000	16.103
Exposed	34	43.0	73	92.4		
Health status						
No medical indication	42	53.2	44	55.7	0.873	0.903
With medical indication	37	46.8	35	44.3		

Based on the table above, it can be seen that there are variables that influence the use of IUD contraception in postpartum mothers at dr. Doris Sylvanus Hospital Palangkaraya, namely education (p-value=0.000) with an OR value of 6.07, husband's support (p-value=0.000) with an OR value of 12.587 and information and counseling (p-value= 0.000) with an OR value of 16.103. At the same time, the variables that did not affect the use of IUD contraception in postpartum mothers were health status (p-value = 0.873).

Table 3. Multivariate Analysis with Logistic Regression Test

Independent Variable	p-value	Exp (B)	95% CI	
			Lower	Upper
Education	0.001	5.403	1.943	15.030

Husband support	0.000	8.675	3.600	20.905
Information and counseling	0.000	7.934	2.737	23.001

Based on the table above, it can be seen that the most dominant variable influences the use of IUD contraception in postpartum mothers at dr. Doris Sylvanus Hospital Palangkaraya, namely the husband's support (p-value = 0.000) with an Exp value (B) of 8.675. Postpartum mothers who do not have the support of their husbands will have a chance of 8.675 times will not use or not become a postpartum IUD acceptor compared to postpartum mothers who have the support of their husbands.

IV. DISCUSSION

Postpartum IUDs are a safe, effective, and convenient method for most women. For women who lack access to reproductive clinics or health facilities, post-copy IUD is the best opportunity to control postpartum fertility. Other advantages are high motivation to maintain health and help the growth and development of infants and guarantee not to get pregnant again soon (14).

The postpartum period is an important time to start contraception but is still underused. Many things contribute to unwanted pregnancy, including lack of patient knowledge, ineffective contraceptive methods, inconsistent use of contraception, unplanned sexual activity, and contraceptive failure. Of the several factors above that are dependent on individual patients, family planning counseling is a factor that is in the realm of the clinician (1).

Components that influence contraceptive use behavior are socio-demographic factors such as age, occupation, number of children, education and family income. Socio-psychology factors such as men's knowledge about contraception, availability of male contraception, distance to the place of service, information and counseling as well as factors that influence the use of health services such as contraception such as health status, service providers, service acceptance and environmental risk factors (15).

Judging from the characteristics that exist in responden there are several factors that can affect the use of IUD contraception in postpartum mothers in dr. Doris Sylvanus Hospital Palangkaraya namely education (p-value=0.001), husband's support (p-value=0.000) and information and counseling (p-value=0.000). The most dominant factor influencing the use of IUD contraception in postpartum mothers is husband support (p-value=0.000) with an Exp (B) value of 8.675, meaning that postpartum mothers who do not get husband's support will have 8.675 times greater chance of not using contraception. Postpartum IUDs were compared with postpartum mothers who received husband support. This is in line with the research conducted by Astuti (2019) that the most dominant related variable is the husband's support variable with a p-value of 0.001 with an OR of 19.591 (95% CI: 3.227 - 118.927). It means mothers who did not get the support of their husbands at risk 19.591 times would not participate as an IUD contraception acceptor postpartum compared to mothers who received husband support.

V. CONCLUSION

Based on the results of research and discussion, it can be concluded as follows:

1. There is no influence of health status on the use of IUD contraception in postpartum mothers in dr. Doris Sylvanus Hospital Palangkaraya.
2. There is an influence of education, husband support, and information and counseling on the use of IUD contraception in postpartum mothers at dr. Doris Sylvanus Hospital Palangkaraya.
3. The husband support is the most influences factor on the use of IUD contraception in postpartum mothers in dr. Doris Sylvanus Hospital Palangkaraya.

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Factors Associated to The Prevalence of Low Birth Weight in Dr. Doris Sylvanus Hospital Palangka Raya 2018

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Abstract- Low Birth Weight Babies (LBW) is the weight of a baby born less than 2,500 grams regardless of gestational age and occurs in infants less than (37 weeks) of pregnancy age. In 2015, there were 15.5% LBW incidence, meaning that 20.6 million LBW infants were born every year and 96.5% of them were in developing countries. This research aims to analyze parity, gestational age, pregnancy complications, anemia, and education related to the incidence of low birth weight babies in dr. Doris Sylvanus Hospital Palangka Raya in 2018. The research is analytical observational research with a case-control research design. Samples of 168 medical record data with case and control comparisons are 1: 1, which is a minimum of 84:84. The sampling technique uses purposive sampling method. The research instrument used a checklist. Data analysis with descriptive and statistical analysis, i.e., chi-square and multiple logistic regression. Factors associated with LBW events were parity ($p=0.009$), gestational age ($p=0.000$), pregnancy complications ($p=0.045$), anemia ($p=0.039$). The results of multiple logistic regression analysis showed age of gestation ($p=0.000$; Exp. B=6.073), and parity ($p=0.016$; Exp. B=2.320) with 95% confidence level. There was a relationship of gestational age and parity with LBW. The most dominant variable is the age of the pregnancy.

Index Terms- parity, gestational age, pregnancy complications, anemia, education, LBW

I. INTRODUCTION

One of the main factors in increasing infant mortality (IMR) is the increased incidence of Low Birth Weight Babies (LBW) (1). LBW is the weight of a baby born less than 2,500 grams regardless of gestation or gestational age and occurs in infants less than months (less than 37 weeks) gestational age or at term (2). According to WHO, in 2015 there were 15.5% LBW incidence, meaning that 20.6 million LBW infants were born every year, and 96.5% of them were in developing countries. Indonesia is a developing country that ranks third in the highest prevalence of LBW (11.1%) after India (27.6%) and is also the second country

with the highest prevalence of LBW in ASEAN after the Philippines (3).

LBW has a high risk of mortality and morality in neonates, especially in the first month of life (4). LBW events will have an impact on the health of infants both at the time the baby is born and at the time of its development in the future, such as the risk of experiencing cardiovascular disease, diabetes mellitus, and mental development disorders (5). Factors related to LBW events include maternal factors such as maternal age, birth distance, previous LBW history, gestational age, the presence of chronic diseases (anemia, hypertension, diabetes mellitus), fetal factors such as hydramion, multiple pregnancies, congenital defects, and placental factors such as reduced placental weight or cellularity, reduced surface area, placental detachment (6).

In 2018 in Indonesia, the proportion of birth weight less than 2,500 grams was 6.2% , and in Central Kalimantan Province, the proportion of birth weight less than 2,500 grams was 5.8% (7). LBW incidence in Central Kalimantan Province in 2017, the number of LBW occurrences was 797 cases, and the number was higher compared to the number of LBW in 2016 as many as 645 cases (8). Based on data obtained from dr. Doris Sylvanus Hospital Palangkaraya 2016, the number of LBW as much as 299 (17.8%) cases and increased the number of LBW in 2017 to 307 (19.5%) cases (9). Based on the study of the problems above, the research will be conducted to analyze the factors associated with the incidence of Low Birth Weight Babies in dr. Doris Sylvanus Hospital Palangka Raya in 2018.

II. RESEARCH METHOD

The study begins by determining the case of pregnant women giving birth to Low Birth Weight Babies (LBW) and determining control that is pregnant women who give birth to Normal Birth Weight Babies. Then they were traced retrospectively whether there are risk factors seen from risk parity, gestational age, complications of pregnancy, anemia, and education. The design of this study was used to determine the factors associated with the prevalence of Low Birth Weight in dr. Doris Sylvanus Hospital Palangka Raya. This study uses secondary data from medical records and registers using checklist sheets as a tool for data

collection. The population in this study were all mothers with babies born alive at dr. Doris Sylvanus Hospital Palangka Raya. The sampling technique in this study was purposive sampling

III. FINDINGS

Table 1. Univariate Analysis of Research Variables

Variable	Category	Frequency			
		Case	%	Control	%
Parity	Risky	54	64.3	36	42.9
	No risk	30	35.7	48	57.1
Age of Pregnancy	Less age	49	58.3	15	17.8
	Enough	35	41.7	69	82.2
Pregnancy Complications	Yes	47	55.9	33	39.3
	No	37	44.1	51	60.7
Anemia	Yes	39	46.4	25	29.8
	No	45	53.6	59	70.2
Education	Low	29	34.5	27	32.1
	High	55	65.5	57	67.9

Table 2. Bivariate Analysis with Chi-Square Test

Variable	LBW Prevalence				p-value	OR
	LBW		Normal			
	n	%	n	%		
Parity						
Risky	54	64.3	36	42.9	0.009	2.400
No risk	30	35.7	48	57.1		
Age of Pregnancy						
Less age	49	58.3	15	17.8	0.000	6.440
Enough	35	41.7	69	82.2		
Pregnancy Complications						
Yes	47	55.9	33	39.3	0.045	1.963
No	37	44.1	51	60.7		
Anemia						
Yes	39	46.4	25	29.8	0.039	2.045
No	45	53.6	59	70.2		
Education						
Low	29	34.5	27	32.1	0.870	1.113
High	55	65.5	57	67.9		

Based on table 2 above, it is known that there are variables that have a relationship with LBW in dr. Doris Sylvanus Hospital Palangka Raya, namely parity (p-value=0.009) with an OR value of 2.400, gestational age (p-value=0.000) with an OR value of 6.440, pregnancy complications (p-value=0.045) with an OR value of 1.963, and anemia (p-value=0.039) with an OR value of 2.045 while the variables that have no relationship with LBW are education (p-value=0.870).

Table 3. Multivariate Analysis with Logistic Regression Test

Independent Variable	p-value	Exp (B)	95% CI	
			Lower	Upper
Parity	0.016	2.320	1.166	4.614
Age of Pregnancy	0.000	6.073	2.923	12.620

Pregnancy Complications	0.367	1.373	.689	2.738
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Based on the table above, it can be seen that the most dominant variable has a relationship with LBW in dr. Doris Sylvanus Hospital Palangka Raya, namely gestational age (p-value = 0.000) with Exp (B) value of 6.073. Pregnant women with the age of the pregnancy for preterm had chances 6.073 times more likely to give birth to low birth weight babies than pregnant women with gestational age term

IV. DISCUSSION

Based on table 1 above, it is known that in the case group, the majority of respondents (64.3%) had risk parity while in the control group (57.1%), the majority of respondents had no risk parity. Risky parity of LBW is parity one and then decreased at parity 2 or 3, then rose again in parity 4 (10). At zero parity or primigravida, the risk of a mother experiencing pre-eclampsia and eclampsia, which tends to cause pregnancy, should be terminated, thereby increasing the risk for premature birth. In contrast, mothers with parity of more than three are at risk of changing the uterus due to repeated pregnancy causing damage to blood vessels in the wall the uterus, which affects the circulation of nutrients to the fetus (11).

Based on table 1 above, it is known that in the case group, the majority of respondents (58.3%) gave birth to LBW babies with a gestational age of less than months while in the control group, the majority of respondents (82.2%) gave birth to normal babies with a gestational age of the pregnancy. Under the drain of pregnancy affect the maturation of the organ and the effectiveness of the distribution of nutrients and oxygenation of the fetal placenta needed for optimal growth (12). Age pregnancy preterm (<37 weeks) causes fetal growth and development have not been optimal so that the risk of babies born weighing less than 2,500 grams.

Based on table 1 above, it is known that in the case group, the majority of respondents (55.9%) experienced pregnancy complications while in the control group, the majority of respondents (60.7%) did not experience pregnancy complications. Complications about signs and symptoms experienced during pregnancy include pre-eclampsia, eclampsia, anemia, premature rupture of membranes, diabetes mellitus, heart disease, placenta previa, placental abruption, polyhydramion (13). Mothers who are experiencing pregnancy diseases, such as infectious and non-infectious diseases, will endanger the condition of the mother and fetus. The disease can disrupt the process of metabolic physiology and gas exchange in the fetus, which results in premature birth so that the risk of LBW (14).

Based on table 1 above, it is known that in the case group, the majority of respondents (46.4%) experienced anemia in pregnancy while in the control group, the majority of respondents (70.2%) did not experience anemia. The lack of Hb levels causes the blood not to be able to send enough oxygen to all tissues so that the metabolic process and the exchange of important nutrients in the tissues are disrupted and the lack of food supply to the products of conception through the placenta (15). This condition

inhibits the growth and development of the fetus, causing LBW birth.

Based on table 1 above, it is known that in the case group and the control group, the majority of respondents (65.5% and 67.9%) with high education. The higher the level of education, the insight possessed by the mother will be higher and have an open mindset to receive new knowledge that is considered useful in her pregnancy (16).

LBW is the weight of a baby born less than 2,500 grams regardless of gestation or gestational age and occurs in infants less than months (less than 37 weeks) gestational age or at term. LBW is very susceptible to illness because its characteristics are not yet mature. Babies with LBW have a higher risk of death, growth retardation, and development during childhood compared to babies who are not LBW (17). Factors related to LBW include maternal factors such as maternal age, birth distance, previous LBW history, gestational age, the presence of chronic diseases (anemia, hypertension, diabetes mellitus), fetal factors such as hydramion, multiple pregnancies, congenital defects, and placental factors such as reduced placental weight or cellularity, reduced surface area, placental detachment.

There are several risk factors associated with LBW in dr. Doris Sylvanus Hospital Palangka Raya, namely parity (p-value=0.009), gestational age (p-value=0.000), pregnancy complications (p-value=0.045), and anemia (p-value=0.039). This is in line with the theory of Prawirohardjo (2014), which says that the first parity is risky because the uterus is the first time to receive the results of conception and the flexibility of the uterine muscles is still limited for fetal growth. While mothers with parity more than 3 have high maternal numbers because endometrial disorders can occur due to repeated pregnancy. This study is consistent with research conducted by Triana (2014), which says that the mother pregnant who have a variety of diseases accompanying pregnancy is at risk of having low birth weight. The disease can interfere with the physiological processes of metabolism and gas exchange in the fetus, which results in premature birth so that the risk of LBW. In line with research conducted by Mahayana (2015), which states that there is a significant relationship between anemia and LBW, this occurs because of the disruption of intrauterine fetal growth and preterm labor.

Risk factors associated with the most dominant LBW's mother was pregnant with the age of the pregnancy for preterm (p-value=0.000) with a value of Exp (B) 6.073. This means that pregnant women with the age of the pregnancy for preterm (<37 weeks) have a chance of 6.073 times more likely to give birth to low birth weight babies than women who just months. This is in line with research conducted by Septiani (2018), which states that there is a relationship between gestational age and LBW events. Supported also by research conducted by Sholiha (2015) based on the results of logistic regression shows that gestational age is a dominant risk factor with LBW with p-value=0.000 and OR 66, meaning that mothers with less gestational age have a 66 times greater risk of giving birth to babies LBW compared to women with gestational age.

V. CONCLUSION

Based on the results of research and discussion, it can be concluded as follows:

1. There is no relationship between education and low birth weight in dr. Doris Sylvanus Hospital Palangka Raya.
2. There is a relationship between parity, gestational age, pregnancy complications, and anemia with low birth weight in dr. Doris Sylvanus Hospital Palangka Raya.
3. The age of pregnancy is the most associated with the incidence of low birth weight in dr. Doris Sylvanus Hospital Palangka Raya.

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Analysis of Customer Complaints on Access, Paramedic Interpersonal Service, and Facilities of Service on The Incidence Forced Discharge

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Abstract- Incidence forced discharge is the request of the patient or the patient's family to go home before his illness cured. In 2019, incidence discharge was 9.36% to 122 cases per month or 1461. It is not compatible with the standards of the Minister of Health Decree No. 129 Years 2008, i.e. incidence forced discharge is $\leq 5\%$. As for the impact of the discharge incident, one of them is the quality of service. The purpose of this study is to analyze the effect of access, interpersonal services of paramedics, service facilities and customer complaints on forced discharge at the Inpatient Installation of the Ratu Zalecha Martapura Regional Hospital. This research is a quantitative observational analytic study with a cross-sectional design. The number of samples for a large sample of hypotheses for two proportions of the population was 222 respondents with the sampling technique was accidental sampling. There was a partial effect of service access ($p = 0.033$), interpersonal services of paramedics ($p = 0.028$), service facilities ($p = 0.046$) and customer complaints ($p = 0.042$) on forced discharges. Results showed no effect of these variables simultaneously on the incidence of forced discharge is ($p = 0.000$) with $p < 0.05$, where the variable access to services ($p = 0.033$) and Exp.B (2.665) is the most dominant variable influence on forced discharge incident. There is a partial and simultaneous influence of access, interpersonal services of paramedics, service facilities and customer complaints on forced discharge, with service access as the dominant variable causing the forced discharge.

Index Terms- service access, interpersonal services of paramedics, service facilities, customer complaints, forced discharge

I. INTRODUCTION

Forced discharges are known as discharge at self-request and are considered a phenomenon in which patients leave the hospital without medical advice (1). Forced discharges are caused by a gap between expectations and services provided so that the follow-up that can be taken by consumers is to either move or leave the place of service accompanied by complaints or non-

reported complaints (2). According to Kotler (2009), the incidence of forced discharges compared to discharged with the agreement of a medical mathematically ranges from a ratio of 1: 9 (3). Although the number of forced discharged events is considered to have a lower number, based on the Minister of Health Decree No. 129 of 2008, the forced discharged at the hospital must meet the standard $\leq 5\%$. The incident of forced discharge certainly does not only harm patients but also on hospitals which is one of the factors that can affect the quality of service.

Accredited hospitals must continue to monitor inpatient care standards, especially those for forced discharges through the Minimum Service Standards (4). Inpatient installation at Ratu Zalecha Martapura Regional Hospital became the target of the study due to inpatient service issues that indicated the incidence forced discharge. In 2019, incidence discharge was 9.36% to 122 cases per month or 1461. It is not compatible with the standards of the Minister of Health Decree No. 129 Years 2008, i.e. incidence forced discharge is $\leq 5\%$ (6).

Ratu Zalecha Martapura Regional General Hospital continues to make improvements to reduce the number of dissatisfaction services, one of which is by facilitating customer complaints. Indicators of customer complaints can be seen through inpatient customer satisfaction surveys, namely the value of the Community Satisfaction Index. In 2019, 80.61% of SMEs that are not following the standards of the Minister of Health Decree (6) with a service element item of "Appropriateness of Care" service quality was average C with 3,010 votes more low compared to other service element items. Based on the 2019 Public Complaints Report, there were 62 complaints from 1461 patients being forced to go home. Inpatient Installation got the highest number of complaints, 33 complaints. It is undeniable that there are still many customers who are less satisfied with health services and are not documented as hospital evaluation materials. The highest source of complaints comes from problems which include (1) Service facilities with 13 complaints, (2) Access to services with ten complaints, and (3) interpersonal services of paramedics with ten complaints.

II. RESEARCH METHOD

This research approach uses quantitative observational analytic research. The design method uses a cross-sectional study design used to analyze customer complaints about access, interpersonal services of paramedics, and service facilities for forced discharge. Research using survey methods. The population in this study was the family of inpatients in the study period in the Inpatient Installation of the General Hospital of Ratu Zalecha Martapura in 2020. Determination of the sample size used the Lemeshow Formula, 1991 for the sample size of the hypothesis of two population proportions namely 222 respondents, and sample size added 10% to anticipate samples that drop out or have missing data. The sampling technique in this study uses accidental sampling. Data analysis used the chis-square test as a bivariate analysis and multiple logistic regression tests as a multivariate analysis.

III. FINDINGS

Table 1. The Characteristic of Respondents

Variable	Category	Freq	%
Incidence Discharge	Forced Discharge	44	19.8
	Not a Forced Discharge	178	80.2
Service Access	Hard to Access	114	51.4
	Easy to Access	108	48.6
Paramedic Interpersonal Services	Bad Service	132	59.5
	Good Service	90	40.5
Service Facilities	Inadequate Facilities	117	52.7
	Adequate Facilities	105	47.3
Customer complaint	Complaints	116	52.3
	1. Service Access	42	35.9
	2. Paramedic Interpersonal Services	34	33.7
	3. Service Facilities	22	33.3
	No Complaints	106	47.7

Table 2. Bivariate Analysis with Chi-Square and Fisher Exact

Variable	Chronic Energy Deficiency				N	p-value	95% CI
	SEZ		No SEZ				
	N	%	N	%			
Service Access							
Hard to Access	30	25.6	87	74.4	117	0.033	2.241 (1.114 - 4.510)
Easy to Access	14	13.3	91	86.7	105		
Service Facilities							
Bad service	27	26.7	74	73.3	101	0.028	2.232 (1.135 - 4.389)
Good service	17	14.0	104	86.0	121		

Inadequate	19	28.8	47	71.2	66	0.046	2.118 (1.070 - 4.195)
Adequate	25	16.0	131	84.0	156		
Customer complaint							
Yes	23	27.4	61	72.6	84	0.042	2.101 (1.077 - 4.096)
No	21	15.2	117	84.8	138		

Based on Table 2, it can be seen that there are variables that have an influence on the incidence of forced discharges at the Inpatient Installation of the Ratu Zalecha Martapura Regional General Hospital, namely access to services (sig. = 0.033) with 95% CI 2.241 (1.114 - 4.510), interpersonal services of paramedics (sig. = 0.028) with 95% CI 2.232 (1.135 - 4.389), service facilities (sig. = 0.046) with 95% CI 2.118 (1.070 - 4.195), and customer complaints (sig. = 0.042) with 95% CI 2.101 (1.077 - 4.096).

Table 3. Multivariate Analysis

Step	Research variable	Wald	B	Exp (B)	Sig.
1	Service Access	6.760	0.980	2.665	0.000
	Interpersonal Service	6.831	0.952	2.590	
	Service Facilities	5.382	0.863	2.369	
	Customer complain	6.999	0.965	2.624	
	Constant		-4.348	0.013	

$$Y = -4,348 + 0,980X_1 + 0,952X_2 + 0,863X_3 + 0,965X_4 + \epsilon$$

Based on Table 3, it is known that the value of sig. <0.05, it can be concluded that service access, interpersonal service of paramedics, service facilities and customer complaints simultaneously influence the incidence of forced discharge and of all the independent variables that most dominantly affect the incidence of forced discharge are service access variables (p-value = 0.033) with a beta exponent value (Exp. B) of 2.665, meaning that access to services will be 2.665 times resulting in the occurrence of forced discharge.

IV. DISCUSSION

Hard service to health access will certainly have an impact on customer expectations so that it will cause dissatisfaction with service (7). There are several indicators of service access that are the cause of service dissatisfaction, namely procedures, completion time, costs, products, facilities and infrastructure as well as service provider competencies (8). Access to health services "hard" and "forced discharge" rated by 30 respondents (25.6%), it is in line with the theory of Fornell and Westbrook (1984) (9). Access to health services "hard" and "no forced discharge" was assessed by 87 respondents (74.4%), which was due to other factors that made service recipients rethink their decision to leave the hospital without medical approval. Access to health service "easy" and "forced discharge" services was assessed as many as 14 respondents (13.3%), this was due to other factors

that made it possible for the occurrence of forced disasters other than access to services, according to Nofiyanto, Utami and Koeswo (2014) such as equipment health, facilities of health, system management and employees, communication or delivery service, attitude/behavior, food service, facility inpatient room, access into the hospital, scheduling service time and time of visits, treatment or diagnosis, and service fees (10). While access to services "easy" and "no forced discharge" valued as much as 91 respondents (86.7%).

The interpersonal service of paramedics is an indicator of health services that can be a priority in determining patient dissatisfaction (7). Meanwhile, if this is not fulfilled, it will cause an indication of a forced discharge. The interpersonal services of paramedics "not good" and "forced discharge" were assessed by 27 respondents (26.7%), similar to the research conducted by Lubis and Simanjorang (2018) (11). Interpersonal care paramedics "not good" and "no forced discharge" in value by 74 respondents (73.3%). The probable reasons why respondents did not go home were because the patient or the patient's family still demanded the use of paramedical personnel interpersonal services better than before, the patient's condition did not allow for forced discharges and risk concerns if forced discharge and the patient's illness increased weight (10). The interpersonal services of paramedics "good" and "forced discharge" were assessed as many as 17 respondents (14%), this was due to other factors that made the occurrence of forced disasters occur apart from interpersonal services of paramedics, according to Sulistyawati (2016), there are several indicators of interpersonal services of paramedics who are the cause of service dissatisfaction, namely medical services, non-medical services, attitudes, information delivery, visit rates, and so on (7). While interpersonal care paramedics "good" and "no forced discharge" valued as much as 104 respondents (86.0%).

Inadequate service facilities indicate the level of health care and facilities obtained and cannot be enjoyed by patients/families in the hospital. So this is a determinant of service dissatisfaction (6). Service facilities are rated as "inadequate" and "forced discharge" is valued by 19 respondents (28.8%), similar to the research conducted by Lubis and Simanjorang (2018) (11). Service facilities rated as "inadequate" and "no forced discharge" were rated by 74 respondents (73.3%). This refutes the theory of Mohseni et al. (2015) explained that the main reason relating to the occurrence of forced discharges was due to relationships within the hospital (such as inadequate equipment and environmental facilities) (12). Service facilities are rated as "adequate" and "forced discharge" are valued by 25 respondents (16.0%), this is due to other factors that make it possible for the occurrence of forced disasters other than service facilities, according to Azar, et al. (2017) variables outside the research that empirically underlie the occurrence of forced discharges, include the atmosphere of the patient's environment, physical facilities, attractive infrastructure, having the latest medical equipment, and cleanliness (13). Whereas, service facilities were rated as "adequate" and "no forced discharge" valued by 131 respondents (84.0%).

Customer complaints will certainly have an impact on the decision to make a forced discharge from the hospital (13), with

complaints such as access to services, interpersonal services of paramedics and service facilities (15). Customer complaints are rated "complaint" and "forced discharge" are assessed by 23 respondents (27.4%), similar to research conducted by Lubis and Simanjorang (2018) (11). Customer complaints are rated "complaint" and "no forced discharge" in value by 61 respondents (72.6%). According to Marlina (2017), there is a feeling of dissatisfaction and did not leave the hospital because the customer provides the opportunity for service providers to return customer satisfaction (13). Customer complaints are rated "no complaints" and "forced discharge" are valued by 21 respondents (152%), this is due to other factors that make possible the occurrence of forced disasters other than customer complaints, according to Fornell and Westbrook's theory (1984), concerning catering, environmental, professional and technical care, service personalization and accessibility (9) whereas customer complaints were assessed as "no complaints" and "non forced discharges" valued by 117 respondents (84.8%).

Service access, interpersonal services of paramedics, service facilities and customer complaints affect the incidence of forced return. This is consistent with the explanation by Fornell and Westbrook's theory (1984: 68) (9). Therefore patient dissatisfaction due to complaints due to mismatches to customer expectations and the reality both in terms of service access, interpersonal services of paramedics and forced discharged should be eliminated to avoid any forced disasters that will negatively impact health care agencies

V. CONCLUSION

1. Access to services affects the incidence of forced discharges in the inpatient installation at Ratu Zalecha General Hospital Martapura ($p = 0.033$).
2. The interpersonal services of paramedics affected the incidence of forced discharges at the inpatient installation at the Ratu Zalecha General Hospital Martapura ($p = 0.028$)
3. Service facilities affect the incidence of forced discharges at the inpatient installation at the Ratu Zalecha General Hospital Martapura ($p = 0.046$).
4. Customer complaints affect the incidence of forced discharge at the inpatient installation at the Ratu Zalecha General Hospital Martapura ($p = 0.042$).
5. Access to services, interpersonal services of paramedics, service facilities and customer complaints also significantly affected the simultaneous incidence of forced discharge ($p = 0.000$)
6. The independent variables that most dominant influenced the incidence of forced discharge were access to services ($p = 0.033$) and ($\text{Exp. B} = 2.665$).

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Analysis of Factors Related to Exclusive Breastfeeding Among Working Mother in The Area of Sungai Ulin Community Health Center, Banjarbaru City

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Abstract- The prevalence of exclusive breastfeeding coverage in Banjarbaru City is still low at 47.8%, and one of the areas contributing to the low achievement is the Sungai Ulin Community Health Center working area with an achievement rate of only 17.8% in 2016. The achievement is influenced by several factors; one of them is the condition of the working mother that can hamper the implementation of exclusive breastfeeding. This research aims to analyze factors related to exclusive breastfeeding in the work area of the Sungai Ulin Community Health Center in Banjarbaru City. This study uses a cross-sectional design with a random sampling technique. Respondents were working mothers who had babies aged 7 months to 12 months totaling 61 respondents. Data were analyzed using chi-square and Fisher exact tests for bivariate and binary logistic regression tests for multivariate. Based on data analysis using chi square and Fisher exact tests, it is known that knowledge (p-value: 0.032; PR: 3.14) and parity (p-value: 0.032; OPR: 3.14) are each related to exclusive breastfeeding. While the place and birth attendants (p-value 0.475) and age (p-value: 0.099) are not related. Multivariate analysis results show that the number of children is the most dominant factor in exclusive breastfeeding (p-value 0.002, exp (B) 11.049). The most dominant factor about exclusive breastfeeding status is parity (p-value 0.002, exp (B) 11.049), which, if explored further, is related to the success of previous experiences in breastfeeding. Therefore, it is expected for the health sector, especially the community Health Center to encourage working mothers to be able to successfully implement exclusive breastfeeding, especially at the time of the birth of their first child

Index Terms- exclusive breastfeeding, working mother, age, knowledge, place and childbirth assistance, parity

I. INTRODUCTION

The World Health Organization (WHO) and the United Nation Children Found (UNICEF) jointly recommend that babies should be given exclusive breastfeeding until they are 6 months old, then continue breastfeeding for up to two years of life (WHO, 2009). In Indonesia, the recommendation to breastfeeding for 6

months of birth has been regulated through several government regulations. Even so, in reality, not all mothers can exclusively breastfeed their babies (Haryani, 2014).

Achievements of exclusive breastfeeding coverage in Indonesia experience a downward trend. Data from the Indonesia Health Profile in 2015 amounted to 55.7% and decreased to 54% in 2016 and 46.74% in 2017. Although higher than the national figure, exclusive breastfeeding coverage in South Kalimantan is also experiencing a downward trend. Data showed 61.4% coverage in 2015 and became 57.7% and 53.68% in 2016 and 2017 (South Kalimantan Provincial Health Office, 2018). Information obtained from the Ministry of Health is also known that South Kalimantan ranks 19th out of 33 provinces in Indonesia. Banjarbaru City ranks fourth in terms of low coverage of exclusive breastfeeding until August 2017. These achievements were recorded at only 47.78%. From the 8 community Health Center in Banjarbaru City, the lowest exclusive breastfeeding coverage was in the working area of Sungai Ulin community Health Center with exclusive breastfeeding coverage of only 17.8% in February 2016 (Health Office of Banjarbaru City, 2016).

Haryani et al. (2014) mentioned that the status of working mothers makes it more difficult for mothers to give breast milk intake to infants. Both in developed and developing countries as well as in Indonesia, working mothers are often faced with a problem, where she has to leave her baby for a certain period. This is because the mother is faced with two choices that are dilemmatic, which is to continue to breastfeed or work to meet economic needs but not to breastfeed regularly or not at all. The results of previous studies conducted by Ariani (2016) in the working area of Sungai Ulin Community Health Center stated that of the 92 mothers sampled in the Sungai Ulin Community Health Center working area, only 11.95% of working mothers had succeeded in giving exclusive breastfeeding to their babies.

Several factors can affect exclusive breastfeeding. William (2011) explains that these factors include the age of nursing mothers, knowledge and place and birth attendants. Another factor is also explained by Rollins et al. (2016) where one of the several influencing factors is the number of children the mother has or is commonly recognized as parity.

Based on the description above, it is important to research factors related to the status of exclusive breastfeeding for working mothers in the working area of Sungai Ulin Community Health Center in Banjarbaru City. By doing this research, it is expected to find a solution to overcome the problem of exclusive breastfeeding for working mothers and be a reference to be applied to the broader community, especially in the working area of Sungai Ulin Community Health Center.

II. RESEARCH METHOD

This study uses a quantitative method with a cross-sectional design. The population in this study were all working mothers who have babies aged 7 to 12 months in the working area of Sungai Ulin Health Center, Banjarbaru City. The method of sampling in this study was to use random sampling techniques and obtained a total of 61 people. Data were collected using a questionnaire. Univariate analysis using frequency distribution and bivariate analysis using the chi-square test. Analysis continued with multivariate analysis with binary logistic regression analysis.

III. FINDINGS

Table 1. Univariate Analysis of Research Variables

Variable	Category	Freq	%
Exclusive Breastfeeding	No	29	47.5
	Yes	32	52.5
Age of Mother	Ineffective age (<25 / ≥35 years)	29	47.5
	Effective age (≥ 25-34 years)	32	52.5
Knowledge	Low	25	41
	High	36	59
Birthplace and Childbirth assistance	Not according to standard	1	1.6
	According to the standard	60	98.4
Number of children	Primipara	25	41
	Multipara	36	59

Table 2. Bivariate Analysis with Chi-Square and Fisher Exact

Variable	Category	Exclusive breastfeeding status				Total	
		Yes		No		N	%
		N	%	N	%		
Age of Mother	Ineffective age	17	58.6	12	41.4	29	100
	Effective age	12	37.5	20	62.5	32	100
Knowledge	Low	16	64	9	36	25	100
	High	13	36.1	23	63.9	36	100
Birthplace and childbirth assistance	Not according to standard	1	100	0	0	1	100
	According to the standard	28	47.5	32	52.5	60	100
Number of children	Primipara	16	64	9	36	25	100
	Multipara	13	36.1	23	63.9	36	100

Table 3. Multivariate Analysis

Variable	Sig.	Exp (B)	95% CI	
			Lower	Upper
Age of Mother	0.009	9.115	1.725	48.176
Knowledge	0.033	3.776	1.114	12.798
Number of children	0.002	11.049	11.049	59.579

IV. DISCUSSION

There is no statistically significant relationship between the age of breastfeeding mothers and exclusive breastfeeding status. The two variables are not related can be caused by several factors. Based on data analysis, in the age group of mothers who produce breast milk effectively most of them succeed in implementing exclusive breastfeeding (62.5%) which is following the theory of William (2011) where in the age range 25-29 years is the effective period in production ASI and certainly will facilitate the mother in giving ASI. However, in the age group that is not effective for producing breast milk, the ratio of successful and unsuccessful breastfeeding is not too different, which can be concluded that at the age of unproductive mothers, not necessarily mothers are not successful in giving exclusive breastfeeding to their children. If traced further, in 12 respondents with age who were not effective in producing milk but managed to carry out exclusive breastfeeding, 11 of them (91.6% of respondents) were aged ≥30 years. At that age (more than 30 years) the mother's decision to give exclusive breastfeeding can be caused by psychological and social maturity, so that makes a person able to be better in the process of forming his behavior (Notoatmodjo, 2003).

Increasing age also indicates that more time is gained to increase knowledge from existing information and insights, especially related to the implementation of exclusive breastfeeding. Strong estimation, this condition is the cause of the results in the study showed that there was no relationship between the age of breastfeeding mothers with exclusive breastfeeding status. The results of this study are in line with previous studies conducted by Nurrohmah et al. (2015) with a p-value of 0.186 (RR: 0.41). This result is also similar to the study conducted by Asemahagn (2016) where the logistic regression results from the study show that older mothers (≥30 years old) practice exclusive breastfeeding (OR 2.07) compared to younger mothers (<30 years). In this study, this was possible because younger mothers considered more aesthetic factors such as changes in breast shape due to breastfeeding caused by breastfeeding with a long duration. Therefore, they are more likely to give formula milk as a substitute for breast milk.

Chi-Square test results on the variable knowledge and exclusive breastfeeding obtained p-value 0.032, which can be interpreted that there is a statistically significant relationship between maternal knowledge and exclusive breastfeeding status. The

results of this test are also supported by a high PR value of 3.13, which means that a high level of knowledge about exclusive breastfeeding will increase opportunities for exclusive breastfeeding by 3.14 times greater than at low levels of knowledge related to exclusive breastfeeding. The results of this study are following the theory described by Notoatmodjo (2003), where knowledge can play an important role in shaping one's actions (overt behavior). The knowledge possessed is basically the result of knowing someone after the person senses. In this case, the person who knows more about exclusive breastfeeding and its benefits will do more seriously so that it is carried out well. In particular, groups of working mothers, who are often exposed to education and information, one of which can be related to exclusive breastfeeding will increase their knowledge and be directly proportional to the implementation of exclusive breastfeeding. This is supported by the table where respondents with a high level of knowledge have a tendency to implement exclusive breastfeeding (63.6%). The results in this study are in line with previous studies conducted by Nkala and Msuya et al. (2011), which found an association between adequate knowledge about exclusive breastfeeding and the implementation of exclusive breastfeeding in mothers of reproductive age. The results of other studies conducted by Wen et al. (2009) showed that mothers who knew information related to exclusive breastfeeding following recommendations from WHO had a 5 times greater chance of implementing exclusive breastfeeding compared to mothers who did not know the information.

The fisher exact test results on the place variables and birth attendants with exclusive breastfeeding status obtained p-value 0.475, which can be interpreted to find no statistically significant relationship between the place and birth attendants with exclusive breastfeeding status. The results obtained in this study are also similar to the research conducted by Novitasari et al. (2019), which states that there is no relationship between the place and birth attendant with exclusive breastfeeding behavior. The absence of a relationship between the 2 variables can be understood because in the table, there are large data differences between categories, where there is only 1 respondent whose place and helper are not in accordance with the standard and the remaining 60 respondents according to the standard. On the one hand this is a positive finding where almost all respondents have realized that delivery in a health facility and assisted by health workers will better guarantee the success of delivery. However, the same table also shows that the comparison between respondents whose place and birth attendants are in accordance with the standards that implement exclusive breastfeeding and not implement exclusive breastfeeding is only slightly, namely 52.5% (32 people) and 47.5% (28 people). Field facts show that of the 28 people whose birth attendants and helpers are in accordance with the standards, 21 of them stated that they received advice from childbirth assistance in relation to exclusive breastfeeding but were unable to carry it out, and 7 others stated that there was no advice from birth attendants regarding exclusive breastfeeding and only recommended for early breastfeeding initiation.

The findings of 7 people who did not get recommendations related to the implementation of exclusive breastfeeding indicate

that health services (in terms of place and health personnel) are still not optimal enough for the successful implementation of exclusive breastfeeding. These two factors should play an important role, but because the duration of the mother who is in the delivery place is only 2-3 days, an explanation of breastfeeding, breast care and guidelines for the implementation of exclusive breastfeeding can not be conveyed properly. Health workers mostly focus on other things, such as postpartum management. This can be one of the other factors that can affect the role of health workers and health facilities not yet related to exclusive breastfeeding (Wulandari and Handayani, 2011).

Chi-Square test results on the variable number of children and exclusive breastfeeding obtained p-value 0.032, which can be interpreted that there is a statistical relationship between the number of children with exclusive breastfeeding status. This result is also supported by a large PR of 3.14, where the value can be interpreted that mothers with multipara will increase the chance for exclusive breastfeeding by 3.14 times greater than in mothers with primipara. This relates to the experience of mothers, where mothers with multiparas certainly have better experience in handling babies compared to mothers who first give birth. Experience has an important role for a mother to do exclusive breastfeeding and becomes the basis for further behavior (Fikawati and Syafiq, 2011). If in the previous birth, the mother succeeded in carrying out exclusive breastfeeding, then the basis of the previous experience will be reflected in the conditions afterward (Rollins, 2016).

The relationship between the 2 variables was found to be understood because 25 primiparous mothers, most of them tended not to implement exclusive breastfeeding (16 people or 64%) and those with multiparous women were more likely to successfully implement exclusive breastfeeding (23 out of 36 respondents or 63.9%). Field facts show that multiparous mothers already have the experience to care for their children. As many as 17 of the 23 respondents stated that they succeeded in implementing exclusive breastfeeding from the previous child and the remaining 6 respondents stated that they failed to implement exclusive breastfeeding in the previous child but were successful in giving it to the last child. A total of 8 respondents from 23 multipara respondents who succeeded in implementing exclusive breastfeeding stated that the way they carry out exclusive breastfeeding is by preparing reserves of breast milk before work, preparing breast milk when he works by storing milk supply at home (pumping milk and storing it in bottles) and then when returning from work. The rest 15 of the 23 respondents stated that they brought their children to work and gave breastfeeding there, of which all respondents work as entrepreneurs

The above results are also in accordance with the explanation of Rollins et al. (2016), where mothers who fail to breastfeed are less likely to try breastfeeding in the next pregnancy, which means this will directly affect the status of exclusive breastfeeding. Mothers have a higher chance of repeating the feeding decision that has been made on the first child for the next child. That is, those who breastfeed in the first baby tend to breastfeed in the next child, and for mothers who do not breastfeed their firstborn, they are less likely to breastfeed the next baby (Vanzo, 1991). This is in line

with research conducted by Becerra and Smith (1990) which found that mothers who breastfed a previous baby were 7.3 times more likely to breastfeed their next baby compared to mothers who had not previously breastfed a baby. Research conducted by Nagy et al. (2001) also get the same result where previous breastfeeding experiences can influence mothers in regulating the duration of the next breastfeeding to the optimal level for them, namely exclusive breastfeeding.

The variable number of children has the largest Exp (B) value of 11.049 that mothers with multipara tend 11.049 to give exclusive breastfeeding compared to mothers with primipara. The number of children is broadly related to the mother's experience in childcare. Someone who has the history or previous experience to take care of their children will certainly get lessons, both in a positive sense (such as being able to properly care for children, provide good nutrition and according with age) and vice versa, and have the opportunity to maintain or improve it in a better direction.

In addition to the number of children, factors related to exclusive breastfeeding status based on multivariate testing are the age and knowledge of mothers. This condition can be understood because the interaction of the 3 factors above will shape the mother's experience in the management and implementation of exclusive breastfeeding. The track record, lessons and techniques obtained by mothers from breastfeeding children before, as well as the ideal age for producing milk will greatly support and facilitate the implementation of exclusive breastfeeding.

The experience described above relates to the successful implementation of exclusive breastfeeding for working mothers, where mothers have a double workload, namely as workers and mothers for their children. Colombo et al. (2018) explained that the obstacles that arise in the implementation of exclusive breastfeeding, such as the limited area of breastfeeding in public areas, limited time due to work, social support and work colleagues and workload (Ishola, et al. 2019). In handling the problem above, the statistical analysis has discussed that most working mothers are able to carry out exclusive breastfeeding, and this success can be caused by the mother knowing how to manage the time and methods related to breastfeeding, that is, before working, preparing ASI when she works by storing milk supply at home (pumping milk and storing it in a bottle) and then when returning from work. Some respondents also stated that they brought their children to work and did breastfeeding there. The ease of mother in implementing this is certainly supported by effective age in producing breast milk and also mother's knowledge about breast milk. This description is in accordance with the results of previous studies conducted by Poduval and Poduval (2009) where when working mothers who give birth and return to work after leave tendency will not change their commitment to the implementation of exclusive breastfeeding but will adjust the method, duration and time for breastfeeding.

Research Wardani et al. (2017) explain that there is a concurrent relationship between age and parity. Other studies by Kitano et al. (2016) also found that there was a strong relationship between parity and age with exclusive breastfeeding. In line with this, Mabud et al. (2014) in his study, stated that there is a relationship

between parity (number of births) and exclusive breastfeeding. Parity is very influential on one's acceptance of something. The more mother's experience, the acceptance of exclusive breastfeeding will be easier. The mother will make the experience as a source of learning to make improvements and solve problems previously encountered. Another study conducted by Tan (2011) explained that mothers with multiparas were almost twice as likely to give exclusive breastfeeding compared to primiparous due to their experience factors.

The results in this study indicate that 12 out of 23 people (52.2% of respondents) multipara respondents who successfully implemented exclusive breastfeeding were mothers with 2 children. The same thing was also found in the research of Da Vanzo, et al. (1990) in mothers with at least 2 children who showed that the decision most frequently chosen by mothers was to repeat the breastfeeding decisions they made with the first child. That is, in mothers who breastfeed their first child it is possible to breastfeed the next child, conversely in mothers who do not breastfeed their first child or experience breastfeeding done by mothers with short duration (less than 6 months), is considered unsuccessful, or unsatisfactory then the tendency will not or there is very little chance of feeding the child afterward. If this is related to the results obtained in this study, where mothers who have more than 1 child, with a productive age, produce breast milk and good knowledge about breast milk, mothers can implement exclusive breastfeeding successfully.

V. CONCLUSION

Based on research that has been done in the working area of Sungai Ulin Community Health Center in Banjarbaru City, it can be concluded that there is a relationship between knowledge (p-value 0.032) and the number of children (p-value 0.032), while the age of breastfeeding mothers (p-value 0.099) and the place and birth attendants (0.475) show no relationship with exclusive breastfeeding status. The multivariate results show that the number of children is the variable most dominant related to the status of exclusive breastfeeding with a p-value of 0.002 and Exp (B) 11.069 times the impact on the status of exclusive breastfeeding.

It is recommended that the Community Health Center be able to give more attention to working mothers who give birth or have children for the first time in order to become the primary target in counseling programs and individual counseling in the hope that the mother becomes more alert and knows information about exclusive breastfeeding and how to practice breastfeeding exclusively during work.

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Analysis of Factors Related to Re-Utilization of Health Care by Hypertension Patient in Polyclinic of Internal Medicine in Datu Sanggul Rantau Hospital

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Abstract- The health care is an essential element in every hospital. The number of visitors at the polyclinic of internal medicine in Datu Sanggul Rantau Hospital was 6906 which is categorized in high utilization, but based on the results of public satisfaction surveys in 2018 on the outpatient unit obtained the results the interval public satisfaction surveys ranged from 2.60 to 3.064 which is the quality of service performance of units of service are less good. This research aims to analyze the factors that relate to the re-utilization of health care by patients with hypertension at the polyclinic of internal medicine in the hospital of Datu Sanggul Rantau. This study uses a quantitative approach with a cross-sectional design. The number of samples in the study was 106 samples with a purposive sampling method. The results showed there was a relationship between completion time ($p = 0.021$), service products ($p = 0,000$), facilities ($p = 0.005$) with the re-utilize of health services by hypertension patients in polyclinic of internal medicine in Datu Sanggul Hospital Rantau. There was no relationship between infrastructure ($p = 0.698$) with the re-utilize of the health services by hypertensive patients in the polyclinic of internal medicine in Datu Sanggul Hospital Rantau. Factors related to the re-utilize of health services by hypertension patients in the polyclinic of internal medicine in Datu Sanggul Hospital Rantau are completion time, facilities, and service products. Service product is the most dominant variable in the re-use of health services by hypertension patients in polyclinic of internal medicine in Datu Sanggul Hospital Rantau.

Index Terms- completion time resolution, product service, facility, infrastructure, utilization, health service

I. INTRODUCTION

Data obtained from the Indonesian Basic Health Research in 2018 states that the prevalence of hypertension in Indonesia is 34.1%, for the population in South Kalimantan Province that is equal to 44.1% (1). The increasing prevalence of hypertension in Tapin District can be seen from the utilization of health services in Datu Sanggul Hospital Rantau. The results of the 2017 annual

report for the number of longtime visitors to the internal medicine polyclinic were 6,906 (2). Outpatient health care is the backbone of the health care system. Outpatient services are the main entry point for residents who need health services (3). The strategic plan of Datu Sanggul Regional Hospital Rantau is stated in strategic issues. One of which is that public trust in private hospitals is higher than in government hospitals, which requires optimal handling. One of the efforts that must be made in improving public services is to conduct a public satisfaction survey (SKM) to service users by measuring the satisfaction of service users. Internal medicine polyclinic is a public service unit in government agencies that directly or indirectly provide services to service recipients (4).

Based on the results of SKM in 2018 conducted by the Datu Sanggul Regional Hospital community satisfaction index in July - September 2018 at the Datu Sanggul Regional Hospital on an outpatient installation based on measurements on the quality of 9 service elements, the results of the SKM score of 76.17, but for the process of creating higher-quality public services, the 9 elements of service in the SKM element must be improved again in outpatient polyclinics especially the average of SKM was only 2.60 for completion time, 2.98 for service products and 2.70 for infrastructure facilities wherein the SKM interval value 2.60-3.064 was the quality of service was not good (5). The length of waiting time for services in the outpatient unit illustrates the performance and quality of hospital services to its customers (6). To keep patients choosing service products in the nerve polyclinic, the hospital must be able to meet the needs of patients so that satisfaction appears, in realizing a good level of customer satisfaction needs to be understood about customer expectations by the service provider (7). According to Wulandari (2016) that there is a significant relationship between facilities and the utilization of health services (8).

Based on the background and identification of the problems above, the problem formulated in this study is the analysis of factors related to the re-utilization of the health services by hypertensive patients in the polyclinic of internal medicine in Datu

Sanggul Hospital Rantau.

II. RESEARCH METHOD

This type of research is an observational analytic study using a quantitative approach with analytic surveys with a cross-sectional design. The population in this study were all hypertensive patients who registered and utilized the service in the disease clinic in Datu Sanggul Rantau Regional Hospital. The sampling method used was purposive sampling. The statistical analysis used is descriptive analysis and inferential statistical analysis.

III. FINDINGS

Table 1. The Univariate Analysis Results

Variable	Category	Freq	%
Completion time	On time	55	51.9
	Not on time	51	48.1
Product service	Well	79	74.5
	Less	27	25.5
Facilities	Complete	74	69.8
	Not complete	32	30.2
Infrastructure	Complete	99	93.4
	Not complete	7	6.6

Table 2. Bivariate Analysis with Chi-Square

Variable	Re-Utilization Health Service				N	p-value
	Less Utilize		Utilize More			
	N	%	N	%		
Completion time						
On time	39	70.9	16	29.1	55	0.021
Not on time	24	47.1	27	52.9	51	
Product service						
Well	37	46.8	42	53.2	79	0.000
Less	26	96.3	1	3.7	27	
Facilities						
Complete	37	50.0	37	50.0	74	0.005
Not complete	26	81.3	6	18.8	32	
Infrastructure						
Complete	58	58.6	41	41.4	99	0.698
Not complete	5	71.4	2	28.6	7	

Based on the table above it can be seen that there is a relationship between the completion time (p-value = 0.021 <0.05), service products (p-value = 0.000 <0.05), facilities (p-value = 0.005 <0.05) and re-utilization of health services by hypertension patient in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau and there is no relationship between infrastructure (p-value = 0.698 > 0.05) with the re-utilization of health services by hypertension patient in the polyclinic of internal

medicine in Datu Sanggul Regional Hospital Rantau.

Table 3. Multivariate Analysis

Independent Variable	p-value	Exp (B)	95% CI	
Completion time	0.025	0.350	0.139	0.878
Product Services	0.002	26.587	3.300	214.177
Facilities	0.150	2.293	0.742	7.089

Based on the table above, from the final logistic regression analysis, the results show that the product service variable is the most dominant factor related, with a p-value <0.05 that is 0.002 and an OR (Odds Ratio) value obtained the largest is 26,587 times providing a strong relationship with the re-utilization of health services by hypertension patient in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau.

IV. DISCUSSION

Based on table 2 that from the analysis using the chi-square test obtained a p-value of 0.021 <0.05, which means there is a relationship between the time of completion with the re-utilization of health services for patients with hypertension in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau, this study averages completion time on time for 37.4 minutes to 55 respondents, while the average completion time that was not on time was 84.40 minutes to 51 respondents, where the timely completion time provided a good re-utilization of health services, one of which was due because the patient had prior experience for a repeat visit to the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau.

Based on table 2 that from the analysis using the chi-square test obtained a p-value of 0.000 <0.05, which means there is a relationship between service products with the re-utilization of health services for hypertensive patients in polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau. The mechanism of good service products in this study can make people re-utilization health services based on the fact that hypertension patients visiting the internal medicine clinic really want to get health services related to hypertension they suffer where the public perception of service products towards the re-utilization of health services is the main indicator of the success of health services.

Based on table 2 that from the analysis using the chi-square test obtained p-value of 0.005 <0.05, which means there is a relationship between the facilities with the re-utilization of health services for patients with hypertension in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau. Facilities can improve the re-utilization of hypertension health services where the facilities available and completed mostly at the polyclinic of internal in Datu Sanggul Regional Hospital Rantau, by 99 people (93.40%) see the type of tensimeter in the polyclinic of internal medicine o measure blood pressure in patients hypertension. Because hypertension is a disease that requires long-term therapy, it requires patient compliance in undergoing treatment to control blood pressure and reduce the risk of complications, where complete facilities can be a motivation to re-

utilization health services for hypertensive patients.

Based on table 2 that from the analysis using the chi-square test obtained a p-value of $0.698 > 0.05$, which means there is no relationship between the infrastructure and the utilization of health services for patients with hypertension in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau. When the research was underway the initial transition from the prevention of the COVID-19 pandemic to social-physical distancing was implemented to be carried out by all people as part of the health protocol, especially those requiring health services in hospitals, so that specialist doctors did not use infrastructure for examination rooms and actions as part of supporting activities in a service process at the clinic, where specialist doctors only conduct more in-depth history to patients. Also, respondents do not pay too much attention to the type of infrastructure/facilities of examination rooms and actions.

Simultaneously the factors that influence the re-utilization of health services (Y) are completion time (X1), service products (X2) and facilities (X3). In this research, service product (X2) is the most dominant variable related to the re-utilization of health services in the disease clinic in Datu Sanggul Regional Hospital Rantau with a significance value of 0.002. From the regression model, it was found that the most dominant factor related to the re-utilization of health services in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau was a service product with an Exp (B) value of 26.587 times greater than other variables. It describes that hypertensive patients visiting the polyclinic of internal medicine want to get health services related to hypertension he suffered. This study is in line with Masri, et al (2017), which explains that there is a significant relationship between product factors, location, promotion, and hospital staff and patient satisfaction in the outpatient room. As one of the most important hospital products that must be considered is in accordance with the needs of patients because the product is something that the hospital can offer to meet the needs of patients and if the product is good it can satisfy the patient (9).

Facility (X3) is related to the re-utilization of health services with a significance value of 0.150 where the with OR 2.293, the facilities with an increase of 1 unit will increase the re-utilization of health services by hypertensive patients by 2.293 times. The highest facility factor for complete types of facilities is tensimeter because hypertensive patients re-utilization more to the polyclinic in controlling blood pressure using tensimeter devices, according to Anderson (1998) in Suratman (2014) defines enabling factors as enabling factors, namely factors that may make sick people use health services. These factors include the family's economic status, access to existing health care facilities. The availability of health service facilities will affect the quality of health status and the status of health problems that occur in the working area (10).

Finally, the completion time (X1) is related to the re-utilization of health services in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau with a p-value of 0.025 where the Exp (B) value is only 0.35 because the completion time is directly proportional to the patient's willingness to re-utilization health services in patients hypertension in internal medicine polyclinics. It can be said that patients who feel the completion

time is not timely but still feels comfortable and suitable to re-utilization their health services because this can be influenced by their perceptions and impressions after receiving the services provided such as good service products and complete facilities for the examination of hypertension. By the Ministry of Health (2016) that the category of the distance between waiting time and estimated examination time can satisfy or not satisfy the patient is when the patient comes from coming to the counter, queuing and waiting for a call to the general poly to be anamnesis and examined by nurses, doctors, or midwives >90 minutes (old category), 30-60 minutes (medium category) and ≤ 30 minutes (fast category). Where waiting time is the time needed from the patient registering until served by a specialist. The purpose of waiting time is the availability of specialist outpatient services on weekdays at each hospital that is easily and quickly accessed by patients (11).

V. CONCLUSION

1. There is a relationship between the completion time and the re-utilization of health services for hypertensive patients in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau.
2. There is a relationship between the facilities and the re-utilization of health services for hypertensive patients in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau.
3. There is no relationship between infrastructure and the re-utilization of health services for hypertensive patients in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau.
4. Service product is the most dominant variable related to the re-utilization of health services for hypertensive patients in the polyclinic of internal medicine in Datu Sanggul Regional Hospital Rantau

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Factors Related to Unmet Need for Family Planning in Couples of Reproductive Age in Kampung KB Banjarbaru City

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Abstract- Unmet need for family planning is the proportion of women of reproductive age in marital status who do not use contraceptives; and/or those who have an unmet need because of health risks and poor use of contraception. According to data from the Office of the Department of Population Control, Family Planning, Women's Empowerment, Community and Child Protection of Banjarbaru City in 2019, the average data of unmet need family planning in Kampung family planning of Banjarbaru City was as much as 14.14%. This research aims to analyze the factors related to the unmet need for family planning for couples of reproductive age in the Kampung family planning of Banjarbaru City. This research uses a cross-sectional with a total sample of 167 is taken proportional stratified random sampling. Data were analyzed using a descriptive statistic, chi-square, and multiple logistic regression. There was a relationship between financing ($p = 0.000$), availability of contraceptive drugs and devices ($p = 0.0001$), and information from field officers ($p = 0.034$) with unmet need for family planning. There was no relationship between knowledge ($p = 0.585$), husband support ($p = 0.147$), and unmet need for family planning. The factor most strongly associated with is the availability of contraceptive drugs and devices ($p=0.0001$) with $PR = 5.743$. There is a relationship between financing, availability of contraceptive drugs and devices, information from field officers, and unmet need for family planning. There is no relationship between knowledge, husband's support, and unmet need for family planning.

Index Terms- financing, availability of contraceptive drugs and devices, information of field office, unmet need family planning

I. INTRODUCTION

Efforts to accelerate the development targets of population control and family planning, can be directly in touch and provide benefits to the people of Indonesia at all levels of the region. The Kampung family planning was a program formed at the regional unit, citizen, or village where there is the integration of development programs between population programs, family planning, family development, and related sector development to improve the quality of life of families and communities (BKKBN,

2017)

The main problem of unmet need for family planning can be viewed from two perspectives, namely the provider and client, in this study, the perspective will be examined in terms of the client. Based on the 2019 BKKBN field officers report, the unmet need for family planning in South Kalimantan Province in 2018 amounted to 11.7%, down in 2019 to 11.1% above the program performance target of 3%. Whereas the unmet need for family planning in Banjarbaru in 2018 by 16.4% fell to 12.4% in 2019 above the unmet need for family planning in South Kalimantan Province and the program performance contract target. In Banjarbaru City, there are currently seven Kampung KB, namely: Pumpung, Cempaka Gunung Kupang, Ramania, Kuranji, Wengga Laura, Landasan Ulin Selatan, and Kemuning. The success indicator of Kampung KB program output is increasing the percentage of contraceptive use (contraceptive prevalence rate/CPR), and the declining percentage of the unmet need for family planning.

Data on the achievement of family planning in the field control report of the Population Control Office, Family Planning, Women's Empowerment, Community and Child Protection (DPPKBPMPPA) of Banjarbaru City in 2019 in each Kampung KB are: 1) Kampung KB Pumpung Kampung with a total couples of reproductive age of 1,869 with CPR of 74.21% and unmet need for family planning of 15.94%; 2) Kampung KB Cempaka Gunung Kupang with 2,200 couples of reproductive age with CPR of 70.64% and unmet need for family planning at 13.55%; 3) Kampung KB Ramania has 5,350 couples of reproductive age with CPR of 67.33% and unmet need for family planning of 11.68%; 4) Kampung KB Kuranji has 5,320 couples of reproductive age with a CPR of 60.47% and a unmet need for family planning of 14.49%; 5) Kampung KB Wengga Laura has 5,872 couples of reproductive age with a CPR of 74.85% with unmet need for family planning of 16.01%; 6) Kampung KB Landasan Ulin Selatan has 1,896 couples of reproductive age with CPR of 73.95% and unmet need of family planning of 12.45%; and 7) Kampung KB Kemuning has 1,544 couples of reproductive age with CPR of 69.49% and Unmet need for family planning of 15.09%. The number of couples of reproductive age (EFAs) in all

Kampung KB in Banjarbaru City was 24,051, with CPR of 69.14% and unmet need for family planning of 14.14%. Unmet family planning needs in the Kampung KB of Banjarbaru City are still high, so they have been chosen as research sites.

According to the results of the 2017 IDHS, the average number of family planning methods known by married women is eight family planning methods compared to married men, which is six methods. Of all women and currently married women, 4% know all modern FP methods, and 5% married men know all modern FP methods. There are 84% of married women's family planning participants pay for family planning methods and services. As many as 57% of EFA women who use family planning methods are carried out with their husbands, 35% are done solely by women, and 7% are carried out by husbands. Sources of information about family planning at EFA were obtained from nurses/midwives at 24%, Family Welfare Education (PKK) at 12%, doctors 7%, and family planning officers 7%, and there was only 1% of women visited by family planning field officers.

Based on the results of the Program Performance and Accountability Survey (SKAP) conducted by the BKKBN South Kalimantan Province Representative in 2019, the percentage of EFA knowledge on all modern family planning methods was 13.6%; know at least 7 modern family planning methods by 43.4%; know at least 6 modern family planning methods by 73%; Knowing at least 5 modern family planning methods by 89.2%; knowing at least 4 modern family planning methods 95.1%; knowing at least 3 modern family planning methods by 98%; knowing at least 2 modern family planning methods by 99.3% and knowing at least 1 modern family planning methods by 99.7% (SKAP, 2019)

The results of the field control report BKKBN South Kalimantan Province Representative until December 2019 the number of private family planning participants in the City of Banjarbaru amounted to 49.70%, the presentation of the role of men in the family planning program in the City of Banjarbaru was 3.69% and the frequency of counseling conducted by the field officers in Banjarbaru City as much as 415 times in 1 year. The number of contraceptive drugs and devices supplies in all family planning facilities in Banjarbaru City at the end of December 2019 was 75 units of IUD, 9,026 gross condoms, 127 implants, 1,409 vials of family planning and 3,553 blisters of birth control pills.

The purpose of this study was to analyze factors related to the unmet need for family planning for couples of reproductive age in Kampung KB of Banjarbaru City.

II. RESEARCH METHOD

This study uses a quantitative research design method of cross-sectional. The population in this study were all couples of reproductive age who live in seven Kampung KB in Banjarbaru City. In this study, the sample that will be sampled are women of Fertile Age who are domiciled in seven Kampung KB in Banjarbaru City who meet the inclusion criteria according to the amount needed based on population calculation of the proportion of precision which is 167 samples. The method of taking samples is proportional stratified random sampling.

III. FINDINGS

Relationship of knowledge with unmet need for family planning

Chi-Square test results showed that there was no statistical relationship between knowledge with unmet need for family planning in Kampung KB of Banjarbaru City with a p-value on continuity correction of 0.585 ($p > 0.05$).

Relationship of financing with unmet need for family planning

Chi-Square test results showed that there was a relationship statistically between financing with Chi-Square test results showed that in Kampung KB of Banjarbaru City with value p-value on continuity correction of 0.000 ($p < 0.05$), the value of prevalence ratio (PR) of 5.700 (95% CI = 2.455-13.233). If seen from the prevalence ratio (PR), it is known that respondents with government funding will increase the chances of not having an unmet need for family planning by 5.7 times higher than respondents with self-financing.

Relationship between the availability of contraceptive devices and drugs with unmet need for family planning

Chi-Square test results showed that there was a relationship statistically between the availability of contraceptive devices and drugs with unmet need for family planning in Kampung KB of Banjarbaru City with a p-value on continuity correction of 0.0001 ($p < 0.05$), prevalence ratio (PR) value of 5.743 95% CI = 2.455-13.233). Judging from the value of the prevalence ratio (PR), it is known that the respondents who have available their availability will increase the chances of not having an unmet need for family planning by 5.743 times greater than those of respondents who do not have the availability of contraceptive devices and drugs.

Relationship between husband's support with unmet need for family planning

Chi-Square test results showed that there was no statistical relationship between husband support with unmet need for family planning in Kampung KB of Banjarbaru City with value p-value on continuity correction amounting to 0.147 ($p > 0.05$).

Relationship between the information of field officer with unmet need for family planning

Chi-Square test results showed that there was statistically relationship between the information of field officers with unmet need for family planning in Kampung KB of Banjarbaru City with value p-value on continuity correction of 0.034 ($p < 0.05$), Prevalence Ratio (PR) of 2.349 (95% CI = 1.127-4.894). If seen from the Prevalence Ratio (PR), it is known that respondents who get field officer information well will increase the chance to not get an unmet need for family planning by 2.349 times greater than respondents who do not get field officer information.

The strongest factors associated with unmet need for family planning

The results of the multiple logistic regression analysis show that the results of the analysis of financing variables and the availability of a contraceptive have a value of $p < 0.05$. The availability of contraceptive devices and drugs is the most significant variable related to unmet need for family planning in

couples of reproductive age in Kampung KB of Banjarbaru City with a p-value of 0.0001.

IV. DISCUSSION

Relationship of knowledge with unmet need for family planning

Based on the calculation of the Chi-Square test about the relationship of knowledge with the unmet need for family planning showed no relationship obtained p-value of 0.585 ($p > 0.05$). Based on the results of the study, in the group of respondents with good knowledge of the unmet need for family planning. The results of observation in the field, respondents with good knowledge but unmet need for family planning caused by the parity by less than two as many as 47.8%. The number of children influencing someone to use contraception. For respondents who have only one child, the reason for not using contraception is because they want to add more children. Whereas for other respondents, the reason for wanting to add children is because they want to have a son (Astuti et al., 2014).

Another thing that affects respondents with good knowledge but unmet need for family planning is the level of education, respondents with good knowledge but unmet need for family planning by 79% with high school education and PT. Some of these respondents were afraid of side effects when using contraception methods so that respondents were reluctant to use any contraceptive methods. Education is an essential factor that influences contraceptive use (Marliana, 2013).

In line with the results of Dewi RF's research, et al. p-value = 0.702, which means there is no significant relationship between wife's knowledge and the unmet need for family planning events. The unmet need for family planning in this study occurred in wives with poor knowledge (44.7%). Most respondents have good wife knowledge (60%), respondents know the intent, purpose, and side effects of contraception in family planning. However, there are still many respondents who do not know the kinds of solid/sterile contraception, the types of natural contraception, and the minimum distance of pregnancy according to health. (Dewi RF, et al. 2018).

Relationship of financing with unmet need for family planning

Based on the situation analysis in the field, this is based on the EFA awareness of the need for family planning and reinforced with good knowledge. Out of 59.14% of respondents who paid for family planning services, 69% had good knowledge about family planning. Extensive knowledge about family planning can influence one's thinking in choosing attitudes to use birth control. (BKKBN, 2015).

Whereas in the group of respondents with government funding or free as much as 10.81% unmet need for family planning and 89.19% unmet need for family planning. Based on the analysis of the situation in the field of 10.81% with government funding but unmet need for family planning is still related to the number of children owned by 62.5% having several children less than 2, respondents assume that even if there is a pregnancy, it will not be anything. Another thing that affects is if the funding is borne by the government, there is not much choice of contraceptive devices and drugs chosen for use.

In line with research conducted by Ardhika, 2018 amounted to 66.29% of EFA women not having family planning because of the high cost of contraceptive services. In line with the research of Pastuti R et al. (2007), the results of the analysis based on the costs incurred to obtain contraception used with the use of an IUD showed a significant relationship ($\chi^2 = 3581.71$; $p < 0.001$).

Relationship between the availability of contraceptive devices and drugs with unmet need for family planning

There is a statistical relationship between the availability of contraceptive devices and drugs and the unmet need for family planning with p-value on continuity correction of 0.0001 ($p < 0.05$), Prevalence Ratio (PR) value of 5.743 (95% CI = 2.455-13.233). Judging from the value of the Prevalence Ratio (PR), it is known that the respondents who have available the availability of their ingredients will increase the chance of not having unmet need for family planning by 5.743 times greater than those of respondents who do not have available their availability.

The analysis of the situation in the field from 16.4% of respondents provided the availability of contraceptives but unmet need for family planning occurred because 75.7% paid for family planning services, in addition there were respondents who were not facilitated by the husband for the cost and did not have a guarantee card so the mother decided not to family planning. Another thing is caused by the status of the work of 94.7% of respondents not working, so they think they will be able to take care of their children at home so that there is no problem if adding children. Others, there have been family planning events but have failed. Some are experiencing side effects from family planning, so they afraid to use birth control again because it is considered uncomfortable.

In line with research conducted by Rizali MI et al (2013) from the statistical test results obtained ($p=0.016$) which means there is a relationship between the availability of contraceptives and the choice of injection contraceptive methods. In line with the research of Setiasih S et al (2016) with the statistical test results obtained p-value=0.049 so it was concluded there is a relationship between the availability of contraception and the choice of long-term contraceptive methods..

Relationship between husband's support with unmet need for family planning

Based on the results of the study, in the group of respondents who did not get the support of the husband experienced an unmet need for family planning by 35.85%, but in the group of respondents who received the support of the husband, there was still an unmet need for family planning by 23.68%. Husband's Support is a form of social support that is defined as verbal or non-verbal information, advice, a tangible help, or behavior provided by people who are familiar with the subject in their social environment and things that can provide emotional benefits or affect behavior (Gottlieb 1983 in Hani 2014).

In line with the study of Aidayasari N (2017), the results of calculations with statistical tests using chi-square can be obtained p-value=0.747, so that it can be concluded that there is no relationship between husband's support and unmet need events. The results of this study indicate the majority of respondents have husband support, husband support as a motivator, especially in the

case that the husband allows the mother to use family planning by 11.3%. The husband's support as an educator in the case of the husband advising the mother if he wants to use family planning is 17.7%. The husband's support as a facilitator is in the case that the husband provides time if the mother wants to have a family planning of 51.61%.

Relationship between the information of field officer with unmet need for family planning

There is a statistical relationship between field officer information and unmet need for family planning with a p-value on the continuity correction of 0.034 ($p > 0.05$). If seen from the Odds Ratio (OR), it is known that respondents who get field officer information well will increase the chance to not get an unmet need for family planning by 2.349 times greater than respondents who lack field officer information. Based on an analysis of the situation in the field of respondents with unmet need for family planning of 58.7% lacking information from the field officer relating to the delivery method, amounting to 91.6% said they never had a home visit from field officer.

Although most people have received information about family planning from various media, most people have not yet received information directly from family planning officers, they only listen to short information from their relatives so that the information obtained is inaccurate and in the end makes respondents hesitate to use contraception. Family planning participants need information that is adjusted to the needs of each family planning participant, usually in the form of procedures for using the contraception method, risks that can be incurred and side effects that can be felt when using one of the contraceptive methods. With the provision of family planning information by officers it is hoped that it can provide changes in behavior and actions so that they consciously become family planning acceptors so that it will reduce the possibility of unmet need family planning (Karmiah, 2017).

In line with the results of Kholida Zia's research (2017) chi square analysis shows that field officer information has a significance of 0.048 which means there is a relationship between field officer information and the unmet need for family planning events in East Java. Based on the results of the study concluded that the information obtained by married women from health workers who visited also influenced the decision to unmet need for family planning. Field officer information can influence the understanding of information about contraceptive devices and methods in effective family planning acceptors.

Relationship between knowledge, funding, availability of contraceptive drugs and devices, husband support and field officer information with unmet need for family planning

Based on the final results of the multiple logistic regression test to determine the independent variable that is most strongly associated with the dependent variable, from the test results it is known that the variable availability of contraceptive drugs and devices is the strongest risk factor associated with unmet need for family planning in couples of reproductive age in Kampung KB in Banjarbaru City with a p-value of significance of 0.0001. The final result of the multiple logistic regression test shows that the unavailability of contraceptive drugs and devices has a risk of

unmet need occurring 5.743 times compared to the people who are available.

Guaranteed availability of contraceptive drugs and devices is to create conditions so that each EFA can easily and safely choose, obtain and use contraceptive devices and drugs in accordance with their choice whenever needed. Provision of contraceptive devices and drugs is also directly related to the function of BKKBN on behalf of the government as stipulated in Presidential Regulation Number 12 of 2013 on Health Insurance that provision of contraceptive devices and drugs are the responsibility of the government or local government. (BKKBN, 2014)

In accordance with Lawrence Green in Nurmala (2018) and Kurt Lewin in Alhamda (2015) one of the factors that affect behavior are enabling factors, is the factor that makes a behavior continued or discontinued, which is included in enabling factors in the occurrence of the unmet need for family planning are availability of drugs and device and financing.

V. CONCLUSION

There is a relationship between financing, availability of contraceptive drugs and devices, and field officer information with unmet need for family planning in couples of reproductive age in the Kampung KB of Banjarbaru City. There is no relationship between husband's knowledge and support with the unmet need for family planning in couples of reproductive age in the Kampung KB of Banjarbaru City.

Availability contraceptive drugs and devices are a risk factor most strongly linked to the unmet need for family planning on Kampung KB of Banjarbaru City. Kampung KB's manager can coordinate with the network health facilities and networks that have been registered with the BKKBN and PBM that are registered with the BKKBN in the family planning village to be able to ensure the availability of supplies is always available to prevent the unmet need for family planning.

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Analysis of Factors Related to Neonatal Mortality in the Hulu Sungai Selatan Regency in 2018

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Abstract- Neonatal mortality is one of the determinants of children's health and well-being. SDGs are targeting to reduce neonatal mortality at least up to 12/ 1000 live births. The neonatal mortality rate in the Hulu Sungai Selatan Regency in 2018 is the highest in the South Kalimantan Province of 18/ 1000 live births. This research aims to analyze the relationship between maternal age, parity, gestational age, pregnancy complications, childbirth complications, infant birth weight, asphyxia, congenital abnormalities, and birth attendants with neonatal mortality in the Hulu Sungai Selatan Regency in 2018. This study was an observational analytic study with a case-control design conducted in Hulu Sungai Selatan Regency. The sample of the study was 41 cases and 43 controls. The result showed that maternal age ($p; 0.486 > 0.05$), parity ($p; 0.775 > 0.05$), gestational age ($p; 0.000 < 0.05$, OR = 23.563), pregnancy complications ($p; 0.001 < 0.05$, OR = 0.154), childbirth complications ($p; 0.002 < 0.05$, OR = 6.660), infant birth weight ($p; 0.000 < 0.05$, OR = 23.560), asphyxia ($p; 0.000 < 0.05$, OR = 11,893), congenital abnormalities ($p; 0.011 < 0.05$), and birth attendants ($p; 0.713 > 0.05$). The logistic regression test results showed a significant gestational age ($p = 0.001$, Exp.B = 29.197). There is a significant relationship between gestational age, pregnancy complications, childbirth complications, infant birth weight, asphyxia, and congenital abnormalities with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.

Index Terms- maternal, infant, neonatal mortality

I. INTRODUCTION

Increasing the degree of health is a part which is not inseparable from the development of national who must be continuously pursued by the government. In addition, an indicator that also is used as a benchmark measuring the progress of the results of the development in the field of health is the number of neonatal mortality (Sihmawati et al., 2018).

According to the Demographic and Health Survey (2017), the neonatal mortality rate (NMR) in Indonesia is 15 per 1,000 births alive. According to Bappenas in 2016, neonatal mortality was one of the determinants of children's health and well-being. Based on the data from the Profile of South Kalimantan Provincial

Health Office in 2018, NMR at the Hulu Sungai Selatan Regency amounted 17/1000 Birth of Life and is the highest NMR compared to other regencies.

According to Achadi (2019), as many as 47% of deaths under five is the death of neonatal relates closely to the quality of service delivery and handling of infants newly born that is less than optimal immediately after birth and a few days the first after the birth. Three-quarters of neonatal deaths occur in the first week, and 40% die within the first 24 hours. The major cause death of a newborn in the year 2016 is premature, complications related to childbirth (asphyxia or difficulty breathing when born), infections and birth defects.

Based on the data, the ministry of health is known that amounted to 46.2% mortality infant caused by problems neonatal, namely asphyxia and low birth weight (Yuwono SR, 2014). Asphyxia is the cause of death neonatal most high (Nurjanah, 2018). According to Tarigan et al. (2017), there are two kinds of causes of death of the baby that is the cause of endogenous and exogenous. Death infant or neonatal endogenous is the death of infants that occurred in the months first after birth, and are generally caused by factors that brought the child since birth, which was obtained from the parents at the time of conception or in the can during pregnancy. While the cause of death of infant exogenous or mortality postneonatal is the death of a baby that occurs after the age of one month until before the age of one year who are affected by the environment outside.

According to research Rachmadiani et al. (2018), which is a risk factor for infant mortality aged 0-28 days in dr. Soebandi Hospital, Jember Regency from the mother factor. There is a relationship significantly between the ages of pregnancy with the death of the baby, the results of the study showed that the age of gestation < 37 weeks of experiencing the risk of death as much as 2.92 times higher than the age of pregnancy ≥ 37 weeks. There is a relationship significantly between the age of the mother at the death of the baby, the results of the study showed that the age of the mother < 20 years and > 35 years experiencing the risk of death baby as much as 4.51 times higher than the mother with the age of 20-35 years.

According to Anita Rahayu and Rodiani (2016), trauma for newborn injuries associated with macrosomia is shoulder dystocia,

clavicular fractures, brachial plexus injury, decreased APGAR score for 5 minutes, prolonged labour intervals, and the need for emergency treatment for macrosomial babies.

According to Oktarina et al. (2017), there is a relationship of parity to neonatal death. Pregnant women giving birth to first to third babies/more have 5.5 times the chance of experiencing neonatal death compared to mothers who give birth to second babies. There is a significant relationship between childbirth complications and neonatal death, that complication that occurs in mothers during labor increase the risk of early neonatal death. Mothers who have complications during labour are five times more likely to have a neonate who dies before they reach 7 days of age compared to women who have no complications during labour and delivery complications.

According to research Tarigan et al., (2017) there was a significant relationship between pregnancy complications and infant mortality, the results showed that mothers with pregnancy complications showed that infant mortality in mothers with pregnancy complications was higher (45.2%) compared to pregnant women who did not experience complications, as many as 16, 6%.

According to research Kurniawan and Melaniani (2018), there is a significant relationship between birth attendants, not health workers and the status of infant mortality, the more babies born are helped not by health workers will increase the chance of 3.67 times the chance of mothers giving birth with the condition of the baby dying.

According to the data of the Office of Health Hulu Sungai Selatan Regency about the neonatal mortality in the year 2017, obtained the data that the number of birth life as many as 3.498 babies, birth-death as many as 38 cases, death of infants aged 0-28 days (neonatal) as many as 59 babies and death of infants aged 29 11th day of the month (post-neonatal) as many as 24 babies.

The research aims to analyze the age of mother, parity, age of the pregnancy, complications of pregnancy, complications of childbirth, birth weight, asphyxia, abnormal congenital, and attendant birth to neonatal mortality in the Hulu Sungai Selatan Regency in 2018.

II. RESEARCH METHOD

This study uses a retrospective approach (case-control). This research located on all the working areas of community health centers in the Hulu Sungai Selatan Regency. There are cases of neonatal mortality based on reports from Health Office of Hulu Sungai Selatan Regency in January to December 2018, which showed that the neonatal mortality (infants aged 0-28 days) as many as 65 babies. The samples in the study are drawn by purposive sampling. The case is the data about the death of infants aged 0-28 days. The controls are set based on the case for a single control (1: 1).

III. FINDINGS

Table 1. Relationship between Independent Variables and Neonatal Mortality in Hulu Sungai Selatan Regency in 2018

Independent Variables	Neonatal Mortality				Total	p-value	OR
	Yes		No				
	n	%	n	%			
Mother age							0.486
<20 years old or > 35 years old	8	61.5	5	38.5	13		
20-35 years old	33	46.5	38	53.5	71		
Mother parity							0.775
1 or > 3 children	14	45.2	17	54.8	31		
2-3 children	27	50.9	26	49.1	53		
Age of pregnancy							0.000
<37 weeks or > 42 weeks	29	87.9	4	12.1	33		23.56
37-42 weeks	12	23.5	39	76.4	61		
Pregnancy complications							0.001
Yes	20	35.1	37	64.9	57		0.154
No	21	77.8	6	22.2	27		
Childbirth complications							0.002
Yes	37	59.7	25	40.3	62		6.660
No	4	18.2	18	81.8	22		
Birth weight							0.000
<2500 grams or > 4000 grams	31	86.1	5	13.9	36		23.56
2500-4000 grams	10	20.8	38	79.2	48		
Asphyxia							0.000
Yes	27	81.8	6	18.2	33		11.89
No	14	27.5	37	72.5	51		
Congenital abnormalities							0.011
Yes	6	100	0	0	6		
No	35	44.9	43	55.1	78		
Birth attendants							0.713
Non-Health Workers	3	37.5	5	62.5	8		
Health workers	38	50.0	38	50.0	76		

Table 2. Multivariate Analysis Results

Independent Variable	p-value	OR	95% CI
Age of Pregnancy	0.002	29.197	3.511 - 242.776
Birth Weight	0.004	14.601	2.378 - 92.363
Asphyxia	0.047	5.629	1.025 - 30.909
Pregnancy Complications	0.001	0.028	0.003 - 0.231

IV. DISCUSSION

Relationship between Mother's Age and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that p-value=0.486 (p>0.05), which means there was no relationship between the age of the mother and neonatal mortality. The results of the analysis of the data in the study have shown that mothers aged 20-35 years are the most neonatal mortality because there are factors of risk like age of pregnancies, complications in pregnancy, and complications in childbirth. It is in line with research by Rachmadiani et al., (2018) that found no significant relationship between the ages of pregnancy with the neonatal mortality, also supported by the research by Tarigan et al. (2017), that there is a relationship that significant between complications of pregnancy with the neonatal mortality and also supported by the research by Oktarina et al., (2017), there is a relationship between complications of childbirth with the neonatal mortality.

Results of the study is consistent with research that is conducted by Batubara and Fitriani (2019), mother age was not associated with risk of death of infants 0-28 days in the regency of Bireuen because the majority of the mother was in the category of 20-35 years which is the ideal age for pregnant and give birth and uterus have been able to carry out its functions with good. At the age of 20-35 years old, the mother understands the factors that can be associated with the death of infants 0-28 days so that steps are taken already perfect.

Relationship between Parity and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that p-value=0.775 (p>0.05), which means there was no relationship between parity with the neonatal mortality. According to Manuaba (2007), parity is divided on parity one is not safe, parity 2-3 safe for pregnant and maternity, and parity more than 3 not safe. The number of parity of pregnant women is one of the predisposing factors for premature birth , and the number of parities can affect the health condition of the mother in pregnancy (Riyanti and Legawati, 2018).

The result of the study is consistent with the results of the study conducted by Rofiqoch et al. (2016) that there was no relationship between parity with neonatal mortality because the mother who gave birth at parity 2-3. Parity 2-3 is not a risk factor for neonatal mortality. It is in accordance with studies of other shows that mothers with multiparity and age of mothers ranged between 20-34 years old have a risk of the occurrence of the neonatal mortality

smaller compared with the mother primiparity aged less than 20 years and multiparous with the age of the mother more than 35 years.

Relationship between Age of Pregnancy and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that p-value=0.000 (p <0.05), which means there was a significant relationship between gestational age and neonatal mortality. Risks at the age of pregnancy less than 37 weeks can result in the occurrence of labour with action midwifery , for example, section cesarean with the presentation of buttocks. Risks at the age of gestation less than 37 weeks at birth preterm can increase the number of death perinatal, as well as with pregnancy more than 42 weeks with the induction of labour , one of the complications is asphyxia neonatorum. Babies born with weight 2000-2500 grams have hope to live more than 97%, 1500-2000 grams more than 90%, and 1000-1500 grams of 65-80% (Hasanah et al., 2016).

According to Wahyu and Rohani (2017), baby preterm especially who was born in the age of gestation <32 weeks, had a risk of death 70 times higher, because they have difficulties in adapting to life on the outside of the uterus due to the immaturity of the system of organs of the body such as the lungs, kidneys, heart and digestive system.

Result of the study is consistent with research conducted by Rachmadiani et al (2018), that there was a relationship between the age of pregnancy with the neonatal mortality. According to Prawirohardjo (2010) the younger the gestational age, the lower the maturity level of the functioning of the infant organs so that the baby will experience many difficulties to live outside the mother's uterus. The more short- term pregnancy, increasingly less perfect growth of organs in the body will be more easily occur complications and increasingly high numbers of death.

Relationship between Complications of Pregnancy and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that p-value=0.001 (p <0.05), which means there was a relationship between complications of pregnancy with the neonatal mortality. Results OR of 0.154 (95% CI 0.054 to 0.445) (OR<1 or 1/OR=6.49) showed that the factors which investigated a protective factor, meaning that mothers with complications of pregnancy risk 0.154 times larger or risky to 6.49 times smaller happened neonatal mortality compared with mothers without complications of pregnancy.

The results of this study are in line with the results of the study by Tarigan et al. (2017), that there was a relationship between complications of pregnancy and infant mortality due to mothers with complications of pregnancy the percentage was higher (45.2%) compared to pregnant women who did not experience complications, as many as 16.6%.

Relationship between Complications of Childbirth and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that p-value=0.002 (p<0.05), which means there is a relationship between childbirth complications and neonatal mortality. The OR result of 6.660 (95% CI 2.013 to 22.031) case this could mean that mothers with complications of childbirth had a risk of 6.660 times larger neonatal mortality compared with mothers who did not exist complications of

childbirth.

Labor complications such as premature labor, premature babies often stop breathing for a few moments, called apnea. Often found at 34 weeks gestation (Sondakh, 2013). The results of this study are in line with research conducted by Oktarina et al., 2017, that there is a significant relationship between childbirth complications and neonatal mortality, complications that occur in mothers during labor increase the risk of early neonatal death. Mothers who have complications during labor are 5 times more likely to have a neonate who dies before they reach 7 days of age compared to women who have no complications during labor. The prevalence of neonatal death is twice as high in women who have complications during childbirth.

Relationship between Birth Weight and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that $p\text{-value}=0.000$ ($p < 0.05$), which means there was a significant relationship between birth weight with neonatal mortality. The OR result of 23.560 (95% CI 7.286 to 76.187), infants with severe birth <2500 grams or > 4000 grams risk 23.560 times larger to neonatal mortality compared with infants who had severe birth 2500-4000 grams.

According to Suryanti (2018), that birth weight is a major risk factor for neonatal mortality. Birth weight is an indicator of the health of newborns; babies with low birth weight (<2500 grams) will have a greater risk of experiencing problems that will come. Low Birth Weight (LBW) is one of the risk factors that have a contribution of 60 to 80% to all neonatal deaths. Babies with LBW have a 10-20 times greater chance of dying than babies born with sufficient birth weight (Shari et al., 2015).

The results of this study are in line with the results of research conducted by Rachmadiani et al. (2018), body weight has a significant relationship with infant mortality 0-28 days with an OR value of 9.66, it can be concluded that infants with bodyweight <2500 grams have a risk 9.66 times more deaths occur than in babies weighing ≥ 2500 grams.

Relationship between Asphyxia and Neonatal Mortality in Hulu Sungai Selatan Regency

Chi-square test showed that $p\text{-value}=0.000$ ($p < 0.05$), which means there is a significant relationship between asphyxia and neonatal mortality. The OR result of 11.893 (95% CI 4.049 to 34.929), which means that infants with asphyxia (Apgar score <7), has a risk of 11.893 times larger to neonatal mortality compared with infants who did not asphyxia (Apgar scores ≥ 7).

Result of the study is consistent with research conducted by Kusumawardani and Handayani (2018), there was a relationship between infants who suffered asphyxia with the incidence of mortality infant with OR 21.614, which showed that babies who experience asphyxia when the birth has risks 21.614 times larger for the neonatal mortality compared to babies who do not experience asphyxia.

Relationship between Congenital Abnormalities and Neonatal Mortality in Hulu Sungai Selatan Regency

Fisher's Exact test showed that $p\text{-value}=0.011$ ($p < 0.05$), which means that there is a significant relationship between congenital abnormalities and neonatal mortality. The results of this study are in line with the research of Rachmadiani et al. (2018), congenital

abnormalities have a significant relationship to neonatal mortality from 0-28 days. Result of the study is also in line with research Kusumawardani and Handayani (2018) that there is a relationship in infants who experience abnormal congenital because of having risk 2.205 times higher for the case of death perinatal compared with infants who did not experience abnormal congenital.

Relationship between Childbirth Attendants and Neonatal Mortality in Hulu Sungai Selatan Regency

Fisher's Exact test showed that $p\text{-value}=0.713$ ($p > 0.05$), which means there is a relationship between the childbirth attendant to neonatal mortality.

Result of the study is consistent with research that conducted by Oktarina et al, 2017, there was no relationship between the birth attendant to neonatal mortality, access to skilful labour including doctors and midwives essential to prevent the death of maternal and neonatal. There is no relationship between the childbirth attendant to neonatal mortality because almost the entire pregnant mother has been doing deliveries in the facility services of health, awareness will be the importance of doing deliveries assisted by personnel of health is already high.

The Most Associated Factors with Neonatal Mortality

The results of the analysis of multivariate of variable age pregnancies, complications of pregnancies, birth weight, and asphyxia obtained results Exp. (B) is the variable age of pregnancy at 29.197, birth weight at 14.601, asphyxia at 5.629 and complications of pregnancy amounted to 0,028. According to Prawirohardjo (2010), the younger the gestational age, the lower the maturity level of the functioning of the infant's organs so that the infant will experience many difficulties to live outside the mother's uterus. The more short-term pregnancy, increasingly less perfect growth of organs in the body will be more easily occur complications and increasingly high numbers of death.

According to Andriana, (2015), gestational age is in accordance with the weight of the infant and the condition of the fetus which if born is not strong enough to live with the infant's organs that are not yet perfect. Care for infants less months and more months will require more intensive care. Gestational age <37 weeks or > 40 weeks will require more intake, adjustment of body temperature, and other complications of the baby.

The results of this study are in line with research conducted by Azizah and Handayani (2017), that there is a relationship between gestational age and neonatal death, ie mothers whose gestational age <37 weeks or > 42 weeks have an 11.9 times greater risk of neonatal deaths compared to with mothers whose gestational age is 37 - 42 weeks with a value of $p = < 0.001$ (OR = 11.9; 95% CI = 4.4 - 32). Babies born at <37 weeks are called premature babies, preterm labour is a dangerous thing because it has an impact on neonatal death, because the shorter the pregnancy period, the less the growth period of the infant's organs in infants so that it is more susceptible to complications.

V. CONCLUSION

1. There is no relationship between mother age and neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
2. There is no relationship between parity and neonatal mortality in the Hulu Sungai Selatan Regency in 2018.

3. There is a relationship between the age of pregnancy with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
4. There is a relationship between complications of pregnancy with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
5. There is a relationship between complications of childbirth with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
6. There is a relationship between birth weight with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
7. There is a relationship between asphyxia with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
8. There is a relationship between congenital abnormalities with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
9. Not there is a relationship between the childbirth attendant with neonatal mortality in the Hulu Sungai Selatan Regency in 2018.
10. Age of pregnancy is the most dominant variable related with neonatal mortality in the Hulu Sungai Selatan Regency in 2018

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Factors Influencing The Nurse Working Fatigue at The Inpatient Unit Idaman Regional Hospital Banjarbaru

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Abstract- Bed Occupancy Rate (BOR) is a number that indicates the percentage of the level of use of the bed at a certain time unit in inpatient units. The high achievement of BOR shows that there is an increase in service usage. This condition also shows that the work activities of health workers in the room have also increased. Increased work activities can be the cause of nurses' work fatigue. Fatigue caused by several factors, among others shifts work, individual factors (health or illness, gender, age, education, workload, tenure, marital status and nutritional status). The research aims to analyze factors influencing working fatigue in nurses at the inpatient unit Idaman Regional Hospital Banjarbaru. This research was an observational analytic study using a cross-sectional design with a sample of 56. The research instrument used a questionnaire and the reaction timer application. Dependent variables were work fatigue and the independent variables were age, sex, work shift, work period, marital status and nutritional status. The test used is the Chi-Square test and the Logistic Regression test for multivariate analysis. The results showed that most work fatigues was the tired category by 75%. There was no significant influence between work fatigue and age ($p = 0.633$), sex ($p = 0.642$), work shift ($p = 0.741$) and nutritional status ($p = 0.484$). There was a significant influence between work fatigue and work period ($p = 0.046$, Exp B = 5.294) and marital status ($p = 0.003$, Exp B = 13.927). The most influential factor on work fatigue is marital status ($p = 0.003$, OR = 13.927). There is an influence between the working period and marital status on work fatigue. There is no influence between age, gender, work shift and nutritional status. The most dominant factor influencing work fatigue is marital status.

Index Terms- work fatigue, age, sex, work shift, work period, marital status and nutritional status

I. INTRODUCTION

The Idaman Banjarbaru Regional Hospital (RSD) is a state-owned hospital. Idaman Banjarbaru Hospital has complete facilities and services, including hemodialysis installation, VIP clinic polyclinic, Medical Checkup, PICU (Pediatric Intensive Care Unit), NICU (Neonatal Intensive Care Unit), Lapat Anak (Born to Get Child Deed) facilities and the availability of Children Deed a complete specialist doctor. Thus the Banjarbaru Idaman Hospital is used as a referral hospital for other hospitals that still

have limitations in health care facilities in the Banjarbaru City area and outside Banjarbaru City (Profile of Idaman Hospital, 2019).

Bed Occupancy Rate (BOR) is a number that shows the percentage of bed use at a specific time in the inpatient unit. The standard ideal value of BOR 70 –85% (Sudra, 2010). The 2019 data stated that BOR achievements in 8 inpatient rooms at the Idaman Banjarbaru Hospital were respectively as follows: BOR Murai room 70.78%, Kasuari room 48.07%, Camar room 80.39%, Nuri room 16.89%, Merak room 5.21%, Cendrawasih room 19.18%, Kenari room 61.89% and Merpati room 90%.

Merpati Room is an inpatient room which has the highest BOR achievement, reaching 90%. The achievement of the BOR was the highest among the rooms in the Idaman Banjarbaru Hospital. This shows the high utilization rate of the bed. The high achievements of the BOR indicate that there has been an increase in the use of Inpatient Installation services in the Merpati room at Idaman Banjarbaru Hospital (IRNA Recapitulation, 2019). This condition also shows that the work activities of health workers in the room have also increased. Increased work activity can be a cause of work fatigue in nurses (Maharja, 2015). The number of beds available in the Merpati Room is 30 beds, and there are 3 officers per shift with the staff ratio, and the number of beds is 1:10. So it can be said one nurse in the room to handle ten beds (recapitulation IRNA, 2019). Then the amount is not following the Decree of Minister of Health No. 262 of 1979 concerning the bed- nurse ratio for type C hospitals is 2: 3 (Ministry of Health Republic of Indonesia, 1979). The number of patients more in line with weather changes and disease epidemiology, it will further increase the workload of nurses, causing work fatigue that affects work performance (Pongantung, 2018).

Fatigue can be caused by several factors including rotation work shifts, individual factors (health or disease, sex, age, education, workload, years of work and nutritional status) (Prमितasari, 2016). Several factors are suspected to be related to fatigue of nurse apes in the Inpatient of Idaman Hospital Banjarbaru, including age, sex, work shifts, years of service, marital status and nutritional status.

II. RESEARCH METHOD

This type of research is analytic observational research with the cross-sectional approach. In this observational study, researchers

do not do or do not give treatment to research subjects, but the subjects themselves "choose" to do it. While the cross-sectional approach is a study that studies the correlation between risk factors, utilizing approach, observation or data collection on age, gender, work shifts, years of service, marital status and nutritional status with nurses working fatigue in the inpatient room at Idaman Hospital Banjarbaru at the same time. The research is using pieces of stuffing and Program Kosinski's Time Reaction Software as a tool for data collection. The population in this study were all nurses in the inpatient room of Idaman Banjarbaru Hospital, totalling 132 people. The sampling technique used in this study uses probability sampling with proportional random sampling.

III. FINDINGS

Table 1. Univariate Analysis of Research Variables

Variable	Category	Freq	%
Work fatigue	Not tired	14	25
	Tired	42	75
Age	Early adulthood	35	62.5
	Mid adult	21	37.5
Gender	Female	31	55.4
	Male	25	44.6
Shift work	Morning	16	28.57
	Afternoon	20	35.71
Protein Consumption Pattern	Night	20	35.71
Years of service	No risk	28	50
SEZ	Risky	28	50
Marital status	Not Married	15	26.79
	Married	41	73.21
Nutritional status	Less	12	21.43
	Normal	41	73.21
	More	3	5.36

Based on the table above, it is known that the majority (75 %) of nurses in the inpatient room at Idaman Hospital Banjarbaru, who were respondents of the study experienced work fatigue. From these results, it can be seen that the majority of respondents did experience fatigue when carrying out their work as nurses. Fatigue usually shows the different conditions of each individual, but all aim to lose efficiency and decrease work capacity and endurance (Siregar, 2019).

Based on the above table, it is known that the majority (62.5%) of nurses in the inpatient room at Idaman Hospital Banjarbaru, who was the study respondents were nurses with early adulthood. The results of this study indicate that the majority of nurses in the inpatient unit of regional hospital aged between 20-30 years. Age is related to maturity. Maturity is technical in carrying out tasks as well as psychological maturity. A person's age increases so the level of technical and psychological maturity and shows the maturity of the soul at work. However, the condition of nurses with ages between 20-30 years makes nurses less able to balance work with the psychological, environmental situation (Siregar, 2019).

Based on the above table, it is known that the majority (55.36%) of nurses in the inpatient room at Idaman Hospital Banjarbaru, who were the respondents of the study were women. In this

modern era, equal rights of women and men are the same. Women are entitled to a good socioeconomic position and how women can develop and progress over time without losing their identity, as well as men (Kondi, 2019). The condition of nurses is predominantly female, and many are married if entering work shifts, especially night shifts with long periods making nurses likely to become tired (Siregar, 2019).

Based on the above table, it is known that the nurses in the inpatient unit Idaman Hospital Banjarbaru study who were undergoing early morning work shifts of 28.57 %, who had as much as 35.71% afternoon shift and night shift workers who undergo as much as 35.71%. Every person has different body time settings known as the circadian rhythm, in the preparation or regulation of work shifts it is necessary to pay attention to the biological time or clock that is appropriate for our body (Siregar, 2019).

Based on the above table, it is known that 50% of nurses in the inpatient room at Idaman Hospital Banjarbaru who were respondents of the study had a risky working period of ≥ 5 years. The working period is closely related to physical abilities; the longer a person works, the more their physical abilities decrease. Physical ability will gradually decrease due to fatigue from work and can be aggravated when doing physical activities can vary in work. Indirectly, the work period will cause contraction of the strengthening muscles and abdominal buffer continuously for a long time. In all complaints that were felt by workers with a work period of less than 1 year, they experienced the most complaints. Then the complaint is reduced in the workforce after working for 1-5 years. However, complaints will increase in the workforce after working for more than 5 years (Tarwaka, 2014).

Based on the above table, it is known that the majority (73.21%) of nurses in the inpatient room at Idaman Hospital Banjarbaru, who were respondents in the study were married. Those who are already married may have the risk of experiencing burnout if the marriage is not harmonious or has a partner who cannot provide social encouragement, including support for work.

Based on the above table, it is known that the majority (73.21%) of nurses in the inpatient room at Idaman Hospital Banjarbaru, who was the study respondents had normal nutritional status. Workers need the energy to be able to work. Fulfilment of nutrition to be able to work must not only be met quantitatively, but also in terms of the nutritional quality of the food consumed. Adequate and balanced eating during the day and before going to sleep significantly affects alertness and quality of sleep. Maintaining health and weight condition not only increases stamina but can also reduce the possibility of sleep disturbance. Proper nutrition and good physical condition have a significant influence on the effects of fatigue (Maghfiroh, 2015).

Table 2. Bivariate Analysis with Chi-Square and Fisher Exact

Variable	Work Fatigue		p-value	OR
	Not tired	Tired		
	n	%	n	%
Age				

Early adulthood	10	28.6	25	71.4	0.633	
Middle Adult	4	19	17	81		
Gender						
Female	9	29	22	71	0.642	
Male	5	20	20	80		
Shift work						
Morning	3	18.8	13	81.3	0.741	
Afternoon	6	30	14	70		
Night	5	25	15	75		
Years of service						
No risk	11	39.3	17	60.7	0.014	5.39
Risky	3	10.7	25	89.3		
Marital status						
Not Married	9	60	6	40	0.000	10.8
Married	5	12.2	36	8.8		
Nutritional status						
Less	4	33.3	8	66.7	0.484	
Normal	10	24.4	31	75.6		
More	14	25	42	75		

Based on the above table it can be seen that there are variables that influence work fatigue of nurses in the inpatient unit Idaman Banjarbaru Hospital, the work period (p-value = 0.014) with OR 5.392 and marital status (p-value = 0.000) with an OR value of 10.800. In contrast, the variables that have no effect on work fatigue are age (p-value = 0.633), gender (p-value = 0.642), work shift (p-value = 0.741), and nutritional status (p-value = 0.484).

Table 3. Multivariate Analysis

Variable	P-value	Exp (B)	95% CI	
			Lower	Upper
Years of service	0.046	5.294	1.031	27.178
Marital status	0.003	13.927	2.442	79.421

Based on the table above it can be seen that there are no variables with p-value > 0.05. So the results of multivariate analysis in this study indicate that marital status is a dominant factor affecting work fatigue with p-value = 0.003 and Odd Ratio = 13.927.

IV. DISCUSSION

Work fatigue in nurses is a condition experienced by nurses who work in other human jobs, where there is a change in negative behaviour in the form of incompleteness in filling nursing care (Bijani, 2016). Fatigue can be caused by several factors, including rotation work shifts, individual factors (health or disease, gender, age, education, workload, work period and nutritional status) (Prमितasari, 2016). Based on the results of bivariate statistics, it was concluded that there was no effect of age on nurses working fatigue in the inpatient room at Idaman Hospital Banjarbaru. The

absence of influence of age on work fatigue is caused by statistically the incidence of work fatigue occurs in both age categories with a not much different percentage of 71.4% occurring in early adulthood and 81% occurring in middle adulthood. In addition, there was no influence of the age of nurses with work fatigue in this study due to several factors including the composition of the age of nurses in each room more than 30 years old. Someone who is young is able to do heavy work and vice versa if someone is elderly then the ability to do heavy work will decrease because they feel tired and do not move nimbly when carrying out their duties so as to affect their performance (Mulfiyanti, 2019). But the results of this study contradict this theory. This may be because young nurses have unrealistic expectations when compared to older workers. As people age, they generally become more stable, more mature and more determined, so they have a more realistic outlook. In addition, it is likely because they have to serve patients with different characters and illnesses every day. They have to deal with a lot of patients so that boredom arises and are fed up with monotonous routines every day. They feel bored because the routine at work is very boring, so that makes them not enthusiastic about serving patients and become lazy to come to work because working hours are very crowded. Workers under the age of forty are most at risk of disorders related to work fatigue (Ramdan, 2016).

Based on the results of bivariate statistics, it was concluded that there was no influence of gender on nurses working fatigue in the inpatient room at Idaman Hospital Banjarbaru. The absence of gender influence on work fatigue is caused by statistically work fatigue occurring in female and male nurses with a percentage of work fatigue in female nurses at 71% and in male nurses at 80%. Biologically women experience menstrual cycles, pregnancy and menopause, and socially. Women have a position as a mother in the household and tradition as a reflection of culture, so women will get tired more quickly (Suma' mur P, 2009). Meanwhile, men experience a higher pressure rating than women, which can be caused by differences in roles, for example in terms of work, for men "working" is an absolute necessity to support their families, but this is not the case for a woman, women may work or not, so it is not a requirement. Men and women differ not only physically, but also socially and psychologically and have different ways of dealing with their problems.

Based on the results of bivariate statistics, it was concluded that there was no effect of work shifts on nurses' work fatigue in the inpatient room at Idaman Hospital Banjarbaru. Respondents in each shift have the same tendency to fatigue, so there is no influence between work shifts and nurses' work fatigue (Maghfiroh, 2015). This is due to the difference in the number of patients in each shift is not too significant. The shift time taken also does not have a significant difference, thus allowing the fatigue experienced is the same (Maghfiroh, 2015)

Based on the results of bivariate statistics, it was concluded that there was an influence of work tenure on nurses' work fatigue in the inpatient room at Idaman Hospital Banjarbaru. The influence of work tenure on work fatigue is caused statistically because work fatigue occurs because work fatigue is more common in nurses with tenure at risk. Whereas nurses with a non-risk work tenure

experience much less work fatigue than those who have a risky tenure. Although with a long work period a nurse gets a lot of work experience, but the monotonous and human service pattern of nurses' work causes physical, emotional and psychological fatigue that leads to heavy work fatigue (Sari, 2015).

Based on the results of bivariate statistics, it is concluded that there is an influence of marital status on nurses working fatigue in the inpatient room at Idaman Hospital Banjarbaru. The influence of marital status on work fatigue is caused statistically due to work fatigue due to more work fatigue in nurses with married status whereas nurses with unmarried status who experience work fatigue are far less than those who are married. Marriage causes increased responsibilities which can make work more valuable and important. So someone who is married will experience work fatigue due to work and when he gets home, he must take care of family needs which time should be used for rest (Huriahni, 2017).

Based on the results of the bivariate statistics, it was concluded that there was no effect of nutritional status on nurses working fatigue in the inpatient room at Idaman Hospital Banjarbaru. This can be caused by work fatigue, especially heavy work fatigue both experienced by nurses who have more or normal nutritional status. Lack of nutritional value of food consumed by daily workers will bring bad effects on the body, such as the body's defence against disease decreases, physical ability decreases, body weight decreases, lack of enthusiasm and lack of motivation, reacts slowly and apathy. In such circumstances, it cannot be expected to achieve efficiency and optimal work productivity. In carrying out the work process, a worker needs adequate sleep and balanced nutrition to be able to maintain work capacity. If the work capacity of a worker is well preserved due to enough sleep and sufficient nutrition, work fatigue that occurs can be minimized (Maghfiroh, 2015).

Based on the results of multivariate statistics, it was concluded that the variable of tenure and marital status influenced work fatigue. The longer a person works, the experience also increases, but the monotony of work so that symptoms arise from work fatigue. Nurses with tenure who are not at risk can experience work fatigue because they are able to adapt to work and their environment so that symptoms of work fatigue arise (Suma'mur, 2014).

Based on the results of the study, nurses who have been married 13,927 times will be more likely to experience work fatigue. Nurses who are married are more likely to experience depersonalization. This happens because the situation is also influenced by external factors, namely in the family environment, such as conflicts within the family, and the conflict is brought to the workplace so that it affects others. When individuals experience depersonalization, it will be difficult for them to be interested again in the activities they have been engaged in. They will start to get bored, uncomfortable and cynical about what is around them to make work fatigue possible (Awalia, 2013).

V. CONCLUSION

1. There was no significant influence between age, gender, work shift, and nutritional status with work fatigue in nurses in the inpatient unit at Idaman Hospital Banjarbaru.

2. There is a significant influence between a work period and marital status with work fatigue in nurses in the inpatient unit at Idaman Hospital Banjarbaru.
3. Marital status is the most dominant factor influencing work fatigue in nurses in the inpatient unit at Idaman Hospital Banjarbaru

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Evaluation of the antifungal activity of *Ficus bengalensis* against *Candida albicans*; an experimental study

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Abstract- Diverse range of bioactive molecules are produced by the plants which making them rich source of different types of medicine. Nowadays, most of the drugs are obtained from natural sources or semi synthetic derivatives of natural products that used in traditional system of medicine. In Ayurvedic treatments, *Ficus bengalensis* (*Vata*) plant uses for so many diseases as topical applications and internal medications. Especially, this herbal plant uses in the treatment of fungal infections. This study was conducted to determine the antifungal activity of *Ficus bengalensis* against the laboratory specimens of *Candida albicans*. The disc diffusion technique was used to test antifungal sensitivity by using Muller Hinton Agar medium. Fluconazole 2.5mg/ml discs were used as controls for comparison with the selected herbal extract. The different concentrated decoctions as sample A, sample B and sample C were prepared by using bark of *Ficus bengalensis* for determine the antifungal activity comparatively. The mean inhibitory zone diameters of sample A, sample B, sample C and control were 13.1mm, 13.9mm, 18.9 and 18.6mm respectively. Sample C showed more inhibitory effect than the effect of sample A, sample B and control drug. It could be concluded that *Ficus bengalensis* has potential effect in the management of infections caused by *Candida albicans*. The efficacy of the decoction increased with higher concentration and prolonged duration of boiling. Further research is necessary to determine the identity of the antifungal compounds within this plant and also to determine its full spectrum of efficacy.

Index Terms- *Ficus bengalensis*; bark decoctions; *Candida albicans*; Antifungal effect

I. INTRODUCTION

Most of the drugs in nowadays are obtained from natural sources or semi synthetic derivatives of natural products that used in the traditional systems of medicine. Thus it is logical approach in drug discovery to screen traditional natural products due to diverse range of bioactive molecules produce by plants which making them rich sources of different type of medicines (Sukanya, Sudesha and Hariprasad, 2010).

Many plant extracts have been used as source of medicinal agents to cure cutaneous infections, urinary tract infections, cervicitis, vaginitis, gastrointestinal disorders, respiratory diseases, helminthic infections, parasitic protozoan diseases and inflammatory processes. *Candida albicans* is most important among the microbial infections for human vaginitis (Biggs and Williams, 2009).

The infection caused by the *Candida albicans* is naturally present in the vaginal tract of women. When the concentration of this fungus increases, the several physical symptoms make their appearance which include an uncomfortable condition, itching in the vaginal area, irritation, inflammation of the labia majora, labia minora or perineal area, vaginal discharge, foul vaginal odor, pain or irritation with sexual intercourse. The biological name for this condition is candidiasis. *Candida albicans* begins to invade and colonize the body tissues. These colonies release powerful chemicals into the blood stream causing such varying symptoms as lethargy, chronic diarrhea, vaginitis, bladder infections, muscle and joint pain, menstrual problems, constipation and severe depression. Sometimes excessive use of antibiotics, birth control pills and steroids will allow candidiasis to become a chronic, systemic infection that cause tissue damage throughout the body. Chemicals produced by the *Candida albicans* attack the immune system and if the immune system weakens it will spread out into various body tissues and colonize (Dawn, 2003).

According to Ayurveda there are twenty *yonivyapad* has described. Those are classified as *vata*, *pitta*, *kapha* and *thrivosaja yonivyapad*. Among those *yonivyapad*, symptoms of *kaphaja yonivyapad* is similar with *Candida albicans* infection. Vitiated *kapha* reaches *yonis* (vagina) and causes the clinical features of itching with mucoid discharges (Tewari, 2000).

Ficus bengalensis belongs to family Moraceae commonly known as *Nuga* in Sinhala has been widely used in different types of traditional medicines. *Ficus bengalensis* is useful in burning sensation, hemoptysis, hemorrhage, diarrhoea, dysentery, diabetes, enuresis, ulcers, skin diseases, gonorrhoea, leucorrhoea and hyperpiesia. According to Ayurveda this plant is cold in potency, cure ulcers, cure herpes, reduces burning sensation, increase complexion and cures disease of vagina (Murthy, 2004). The prepared *qwatha* of *Ficus bengalensis* bark used for the treatment in *Candida albicans* vaginal infection (Buddhadasa, 2007).

Objectives of this study were to determine the antibacterial effect of *Ficus bengalensis* against the laboratory specimen of *Candida albicans*.

II. METHODOLOGY

Bark of *Ficus bengalensis* were collected from the Gampaha District of Sri Lanka. All materials were cleaned by using hot water.

- Preparation of Drug

The plant extract were prepared as three samples in different decoctions. Sample A was prepared by using 60g bark of *Ficus bengalensis* with 1920ml of water boiled under moderate heat for 2 hours and obtain 240ml of decoction. Sample B was prepared by using 60g bark of *Ficus bengalensis* with 1920ml of water boiled under moderate heat for 2 ½ hours and obtain 120ml of decoction. Sample C was prepared by using 60g bark of *Ficus bengalensis* with 1920ml of water boiled under moderate heat for 3 hours and obtain 60ml of decoction.

- Preparation of Sensitivity discs

Whatman No. 1 filter paper was used to prepare sensitivity discs. The sterile discs of 5 mm in diameter was impregnated with selected herbal extract for 24 hours, and dried in a hot air oven at 60°C for 5 minutes and stored in small plastic tubes with silica jell packs.

- Preparation of Inoculum

3-5 colonies of standard strain *Candida albicans* was suspended in 9 ml of distilled water. The turbidity was adjusted to be visually comparable with 0.5 McFarland standard.

- Preparation of Muller Hinton Agar

Muller Hinton Agar was prepared from a commercially available dehydrated base according to the manufacturer’s instructions. It was allowed to cool in a 45 to 50°C water bath immediately after autoclaving. Freshly prepared and cooled

medium was poured into flat bottomed petri dishes in a horizontal surface to give a uniform depth of approximately 4 cm. This corresponds with 25 to 30 ml for plates that having diameter of 100 mm. The plates were incubated at 37°C for 1 hour and allowed to solidifying at room temperature.

- Preparation of control drug

Fluconazole (Pfizer-Roerig, Inc., New York, N.Y.) 2.5mg/ml final stock concentrated discs were prepared to use as controls for comparison with the selected herbal extract.

- Preparation of Petridis

Inoculum was spread over the nutrient agar plate with sterile cotton swab in order to obtain uniform microbial growth. Discs were placed in the center of the agar and 10 groups of discs were prepared. The fluconazole 25mcg discs were used as controls for comparison with the selected herbal extract. The plates were incubated for overnight at 37°C and measured the inhibition zone by using normal ruler.

- Interpretation of the zone sizes

The zones size of antimicrobial action was measured by using the interpretative chart that reporting the organisms as ‘Resistant’, ‘Intermediate sensitivity’ and ‘Sensitivity’ (susceptible).

Zone size for fluconazole 2.5mg/ml: Resistant < 14mm, Susceptible dose dependent – 15mm-18mm, Sensitive > 19mm

III. RESULTS

Table 1: Inhibitory Zone Diameters in Disc group 01

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	12	14	18	18

Table 2: Inhibitory Zone Diameters in Disc group 02

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	13	15	20	24

Table 3: Inhibitory Zone Diameters in Disc group 03

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	10	10	15	13

Table 4: Inhibitory Zone Diameters in Disc group 04

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	13	14	18	15

Table 5: Inhibitory Zone Diameters in Disc group 05

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	14	14	19	18

Table 6: Inhibitory Zone Diameters in Disc group 06

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	14	14	21	20

Table 7: Inhibitory Zone Diameters in Disc group 07

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	13	11	15	17

Table 8: Inhibitory Zone Diameters in Disc group 08

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	15	17	25	23

Table 9: Inhibitory Zone Diameters in Disc group 09

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	14	16	19	20

Table 10: Inhibitory Zone Diameters in Disc group 10

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	13	14	19	18

Table 11: Mean inhibitory zone diameters of Samples with Fluconazole

Type of disc	Sample A	Sample B	Sample C	Fluconazole 2.5mg/ml
Zone diameter (mm)	13.1	13.9	18.9	18.6

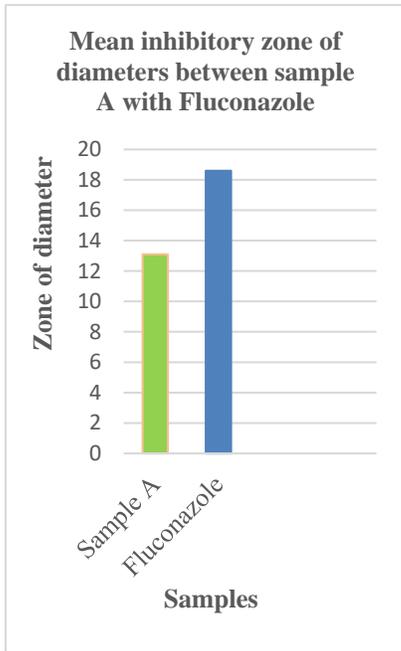


Figure 1: Mean inhibitory zone diameters of Sample A and Fluconazole

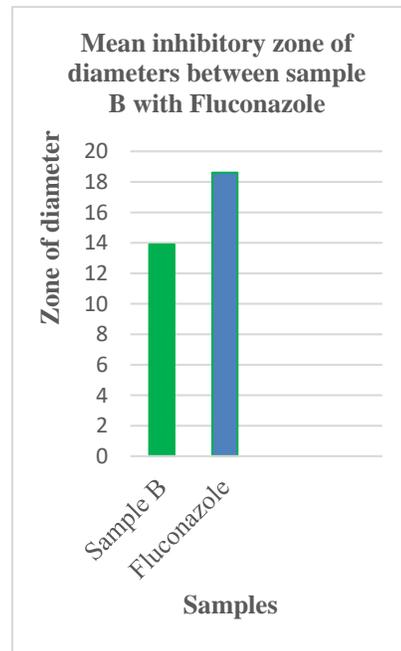


Figure 2: Mean inhibitory zone diameters of Sample B and Fluconazole

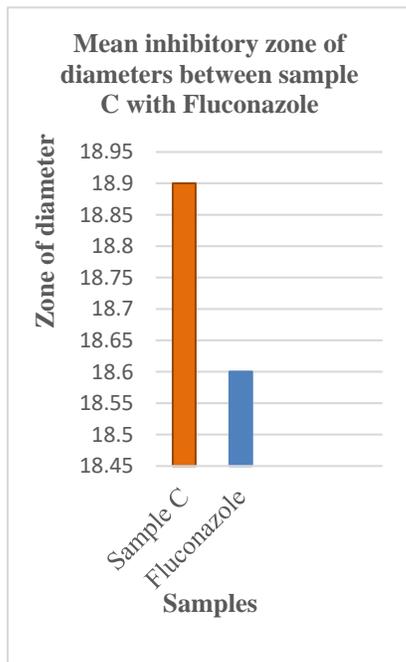


Figure 3: Mean inhibitory zone diameters of Sample C and Fluconazole

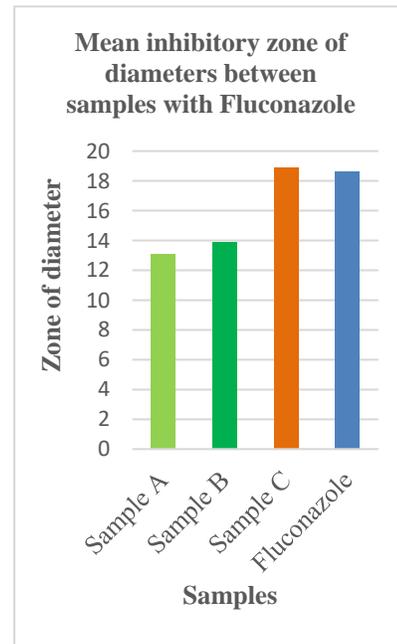


Figure 4: Mean inhibitory zone diameters of Sample A, B, C and Fluconazole

IV. DISCUSSION

Plant based antifungal compounds have enormous therapeutic potential as they can serve the purpose without any side effects. This study was conducted to determine the antifungal activity of *Ficus bengalensis* against the laboratory specimens of *Candida albicans*. The disc diffusion technique was used to test antifungal sensitivity by using Muller Hinton Agar medium. Fluconazole 2.5mg/ml concentrated discs were used as controls for comparison with the selected herbal extract. The different concentrated decoctions as sample A, sample B and sample C were prepared by using bark of *Ficus bengalensis* for comparative determine of the antifungal activity.

Sample A was prepared by using 60g bark of *Ficus bengalensis* and added 1920ml of water and boiled under moderate heat for 2 hours to obtain 240ml of decoction. Mean inhibitory zone diameter of Sample A discs had given 13.1mm. Sample B was prepared by using 60mg of the bark of *Ficus bengalensis* and added 1920ml of water and boiled under moderate heat for 2 and half ours to obtain 120ml of decoction. Mean inhibitory zone diameter of Sample B discs had given 13.9mm. Sample C was prepared by using 60g of the bark of *Ficus bengalensis* and added 1920ml of water and boiled under moderate heat for 3 hours to obtain 60ml of decoction. Mean inhibitory zone diameter of Sample C discs had given 18.9mm. Mean inhibitory zone diameter of 2.5mg/ml of fluconazole discs had given 18.6mm.

It was clear from the present results, that high concentration of decoction of *Ficus bengalensis* exhibited pronounced activity against the *Candida albicans*. The results showed that the high concentration of *Ficus bengalensis* had more inhibitory effect than the other low concentrations. This tends to interpret that the active ingredients of the bark of the *Ficus bengalensis* is better extracted with adding more water, prolong boiling time and high concentration than others. The results showed sample C had more inhibitory effect than fluconazole 2.5mg/ml. It means the efficacy of sample C is better than fluconazole against *Candida albicans*. Therefore, decoction of Sample C can use to treat for *Candida albicans* infection.

Continued further exploration of plant derived antifungal drugs are needed today. Further research is necessary to determine the identity of the antifungal compounds from within this plant and also to determine its full spectrum of efficacy. However, the present study of in antifungal evaluation of some plants forms a primary platform for further phytochemical and pharmacological studies to discover new antifungal drugs.

V. CONCLUSION

Standing on above results it was concluded that *Ficus bengalensis* has antifungal activity against *Candida albicans* infection. The efficacy of the decoction increased with higher

concentration and prolonged duration of boiling. The efficacy of the Sample C was better than 2.5mg/ml of fluconazole. Further research is necessary to determine the identity of the antifungal compounds within plants and also to determine their full spectrum of efficacy. However, the present study of in vitro antifungal evaluation of some plants forms a primary platform for phytochemical and pharmacological studies to discover new antibiotic drugs.

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